



Submitted to:  
US Environmental Protection Agency  
Chicago, IL

Submitted by:  
AECOM  
Chicago, IL  
60312502  
July 10, 2015

# **Remedial Documentation Report**

## **Navy Pier**

### **600 East Grand Avenue**

### **Chicago, Illinois**





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July 10, 2015

Ms. Verneta Simon  
USEPA REGION 5  
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Mail Code: SE-5J  
Chicago, IL 60604-3507

**Subject: Remedial Documentation Report for Navy Pier, 600 East Grand Avenue, Chicago, Illinois, AECOM, Inc. Project No. 60312502**

Dear Ms. Simon:

Enclosed is the Remedial Documentation Report for the removal of radiologically-contaminated fill soil completed by AECOM at the above referenced property.

Should you have any questions, please contact us at 312-373-7700.

Regards,

Brian R. Schmidt  
Project Scientist II

Steven C. Kornder, Ph.D.  
Senior Project Geoscientist

cc: S. Haemmerle, NPI  
D. Blondin, NPI

## Contents

<b>1.0 Site Background .....</b>	<b>1</b>
1.1 Site Location .....	1
<b>2.0 Radiological Remediation .....</b>	<b>2</b>
2.1 Initial Survey.....	2
2.2 Thorium Contaminated Fill Soil .....	2
2.3 Test Pit Delineation.....	2
2.4 Contaminated Fill Soil Remediation .....	3
2.5 Verification Sampling .....	4
2.6 Equipment Release Surveys.....	4
2.7 Asbestos Air Monitoring.....	5
2.8 Personal Air Monitoring .....	5
2.9 Exclusion Zone Release.....	5
<b>3.0 Quantity of Radiologically-contaminated Fill Soil Removed .....</b>	<b>6</b>
<b>4.0 Radiologically-contaminated Fill Remaining On-Site .....</b>	<b>7</b>
<b>5.0 Summary and Conclusions .....</b>	<b>8</b>

## List of Figures

Figure 1 – Remedial Excavation

## List of Appendices

Appendix A Waste Characterization Analyses

Appendix B Work Plan

Appendix C Training Attendance Sheet

Appendix D Verification Sample Results

Appendix E Remediation Excavation Photographs

Appendix F USEPA Signed Notification of Successful Verification Sampling Forms

Appendix G Disposal Information

Appendix H Equipment Release Survey

Appendix I Asbestos Air Monitoring

Appendix J Personal Air Monitoring Results

Appendix K Equipment Calibration Records

# **Remedial Documentation Report Navy Pier - 600 East Grand Avenue**

## **1.0 Site Background**

### **1.1 Site Location**

Navy Pier is located at 600 East Grand Avenue in Chicago, Illinois (the Site). The Site is located in an area of reclaimed land where fill soil material was placed along the Lake Michigan shoreline starting in the 1860s. This area of Chicago is commonly referred to as Streeterville. Redevelopment of several properties north of the Chicago River in the Streeterville neighborhood of Chicago, Illinois have been found to exhibit evidence of radiological-contaminants from the former processing of thorium-bearing mineral sands by Lindsay Light and Chemical Company (Lindsay Light).

The radiologically-contaminated fill soil was originally generated as a byproduct from a former gas mantle production that used thorium nitrate in its manufacturing process. Lindsay Light facilities operated in Streeterville at 22 West Hubbard, 316 East Illinois, and 161 East Grand. The radiologically-contaminated material was generated during the production of gas mantles, which used thorium in its manufacturing process. These manufacturing operations were conducted from the early 1900s through the early 1930s. The radiological contamination consists of elevated concentrations of thorium and their radioactive decay related daughter products in the fill soil in the vicinity of the former Lindsay Light site.

Due to the proximity of this property to the manufacturing sites and documented cleanups at other properties in the Streeterville area the USEPA, which has oversight authority for radiologically-contaminated sites, requires that radiological surveys be completed prior to and during site development that will disturb subsurface fill soils within the moratorium area commonly referred to as the Streeterville thorium investigation area.

## 2.0 Radiological Remediation

### 2.1 Initial Survey

While screening for the excavation and installation of a storm water retention basin early in the afternoon of April 9, 2014, AECOM observed a thin reddish orange fill soil layer with elevated gamma readings. The layer was encountered at a depth of approximately 5 feet below the ground surface, while benching along the northern perimeter of the excavation. The maximum gamma reading observed was 101,000 counts per minute (cpm) unshielded. For reference, the field instrument threshold of 18,774 cpm is equivalent to the United State Environmental Protection Agency (USEPA) cleanup value of 7.1 pico-curies per gram (pCi/g) total radium. A phone call to Eugene Jablonowski (USEPA) was made early in the afternoon to provide notification of the discovery and an email including photos and a sketch was sent to the USEPA later that same afternoon.

There were several feet of non-radiologically contaminated fill soil (overburden) in-place above the contaminated fill layer. A couple of steel plates were pushed into the ground to prevent direct contact and minimize the contaminated fill from sliding into the retention excavation and also allow construction work to continue within the excavation. The contamination appeared to be a layer about 6 inches thick that extended approximately 7-9 feet horizontally along the excavation wall. No contaminated soil was excavated and no additional excavation of contaminated material was necessary to complete the installation of the storm water retention basin.

### 2.2 Thorium Contaminated Fill Soil

The USEPA visited the Site between 8:00 and 8:30AM on Thursday April 10, 2014. At the request of the USEPA, AECOM collected a sample of the contaminated fill soil for gamma spectroscopy analysis. The sample was transported to RSSI in Morton Grove, Illinois (RSSI) for analysis later that day. The results of the gamma spectroscopy analysis were received on Friday, April 11, 2014. The results (refer to Appendix A) indicated a radium-228 activity of 88.5 pCi/g and a radium-226 activity of 2.19 pCi/g (based on bismuth-214). Based on the gamma spectroscopy analysis, the fill layer appeared consistent with contamination from Lindsay Light. This gamma spectroscopy information was also provided to the USEPA.

The sample also contained some apparent strings that were approximately a 1/16-inch in diameter and 4-inches long. These strings were potentially believed to be mantle strings. Because the material appeared to contain ash there was the possibility that these strings could contain asbestos since they appeared to survive the burning process. Several of the strings were submitted to STAT Analysis Corp. (STAT) to determine whether they contained asbestos. Lab results from STAT were received late in the afternoon of Friday, April 18, 2014. The results of the polarized light microscopy (PLM) indicated the strings were approximately 20-25% chrysotile (refer to Appendix A).

### 2.3 Test Pit Delineation

To confirm that the radiological contaminated soil area was not extensive, two test pits were excavated on the morning of Friday April 18, 2014. These test pits were excavated to the north and west of the area of known thorium contamination to delineate the extent of the contamination (i.e., knowing that it is delineated to the east and south by the excavation already completed). The intent was to excavate each test pit to just beyond the depth of original contamination. Specifically, the test pits were intended to confirm that the contamination did not extend significantly to the north or west toward the roadway.

No contaminated fill soil was excavated during the test pit delineation process and the extent of the thorium contamination was able to be better delineated. Based on the gamma survey results the contaminated fill soil extended less than 14-feet to the north and did not extend to the west beyond

the existing ComEd duct bank. This duct bank runs north-south approximately 8-feet west of the concrete retention basis (Figure 1). Based on the survey results during the excavation work and test pit exploration, the area of elevated gamma readings (contamination) was less than 140 square feet. Fill soil excavated from each test pit was returned to the excavation immediately after completing the delineation efforts.

## **2.4 Contaminated Fill Soil Remediation**

The remedial work was conducted utilizing the procedures and methods approved for projects within Streeterville and summarize in a work plan (Appendix B) that was approved via email by USEPA on May 8, 2014.

Although the mantle ties had only been observed in fill soil with elevated gamma readings, a sample was collected on May 8, 2014 from the overburden fill soil above the location of the contamination to confirm the absence of asbestos. The laboratory analysis did not identify asbestos in the overburden soil sample (refer to Appendix A). These results, as well as the gamma screening, appear to confirm that the asbestos is limited to the thorium contaminated fill soil layer. Therefore, removal of the thorium contaminated fill soil was expected to effectively remove the apparent mantle related asbestos.

Site and project specific radiation and health and safety training was provided to the on-site personnel prior to the start of remediation work on the Site. Training included discussion of radiation basics, anticipated hazards, equipment to be worn, safety practices to be followed, contamination prevention practices, and emergency procedures as well as a discussion of the site-specific Health and Safety Plan (HASP). Training was conducted by Field Team Leader Steve Kornder (AECOM) and health physicist Glenn Huber of Stan A. Huber Consultants, Inc.(SAHCI). A copy of the outline of the training and the training attendance sheet are included in Appendix C.

The remediation work started at approximately 10PM on Saturday May 11, 2014 and was completed by 4AM on May 12, 2014. The total volume of soil anticipated to be remediated was relatively small, so 1-cubic yard bulk material bags were utilized. A light rain occurred just prior to the start of the soil excavation work, so soil conditions were wet and there was little or no wind. Thus, dust was not an issue during the work.

An exclusion zone was set up around the area that was believed to contain the buried contamination. The only individual to enter the excavation area (exclusion zone) during the remediation was Glenn Huber of SAHCI. The excavator, with the exception of the bucket, and the remainder of the personnel were kept outside of the exclusion zone. Air monitoring for asbestos was setup at the perimeter of the work area. The monitoring included three stationary monitors and one personal monitor on the individual positioned near the bulk material bags as they were being loaded.

Remediation activities started at the southern edge of the exclusion zone area next to the steel plates. Work started with the excavation of the clean overburden, which was placed into a roll-off container so that it could be moved out of the way of construction activities. The excavation of overburden continued until the contaminated soil layer was exposed at a depth of about 5-feet.

Once the majority of the overburden had been removed, excavation of the contaminated soil commenced. Contaminated soils excavated were placed directly into the bulk material bags. Seven (7) one yard bags were filled with radiologically contaminated fill soil. Apparent mantle strings were visible throughout most of the remediation work. However, no mantle string were visible once the field gamma measurements indicated the contamination had been removed (i.e., the mantle strings appear to be associated directly with the thorium contamination). The approximate surface area of the remediated area was about 150 square feet and the contaminated soil layer had a thickness of approximately 1-foot. The final depth of the remedial work was about 6-feet below the existing surface.

## 2.5 Verification Sampling

Since the base of the excavation was small, a single verification sample (NPV1) was collected for the area. The sample was submitted to RSSI for analysis. The gamma spectroscopy results indicated a total radium activity of 1.3 pCi/g, which is well below the USEPA cleanup value of 7.1 pCi/g.

Asbestos samples were also collected and submitted to STAT Analysis. The asbestos results include samples from the excavation floor as well as the east, north and west sidewalls. The western wall sample was collected from an area beneath the ComEd duct bank and beneath the thorium contamination that was being left in-place. No sample was collected from the southern wall since this wall was a steel plate. These results did not detect the presence of asbestos in the samples. Copies of these gamma spectroscopy and asbestos verification samples are included in Appendix D. Several photographs of the remediated area included in Appendix E.

It was not possible to remove contaminated soil from beneath the duct bank without potentially undermining the duct bank. Therefore, in consultation with the USEPA at the Site during the remedial activities, it was agreed that the contaminated materials would be left in-place. The shielded gamma readings for a majority of the contaminated area ranged from 6,700 to 11,000 cpm shielded. These gamma counts measured in the western wall were substantially less than those observed for the remediated material, which ranged from 25,000 to 65,000 cpm shielded. The shielded gamma count for the instrument threshold equivalent to the USEPA cleanup value of 7.1 pCi/g is 6,137 cpm.

Previously (on April 18, 2014) a 9-foot long test pit was excavated along the western side of the duct bank. The test pit depth extended below the duct bank to the depth at which the contamination had been originally observed east of the duct bank. Gamma readings measured by AECOM within the test pit, and for spoil in the excavator buckets from the test pit, did not indicate elevated gamma readings at the base of the test pit. However, gamma measurements along the eastern wall of the test pit (i.e., beneath the western side of the duct bank) did indicate slightly elevated gamma readings or shine from contaminated soil beneath the duct bank. Thus, the contamination left in-place is confined to a thin layer beneath the duct bank. Based on these observations it is estimated that the contamination is confined to an area below the duct bank with the dimensions of approximately 1-foot thick, 3-feet wide and 12-feet long (approximately 1.3 cubic yards).

A second sample (NPV2) was collected by the USEPA for gamma spectroscopy from the area of contamination located in the western wall of the excavation beneath the ComEd duct. The sample was biased toward the higher gamma readings observed in the excavation wall below the duct bank. Gamma spectroscopy results from RSSI for the sample (NPV2) indicated a total radium activity of 45 pCi/g. The gamma spectroscopy results for this sample are included in Appendix D.

After completing the remedial and sampling activities the excavation (exclusion zone) was fenced. Orange plastic snow fencing was also placed against the western excavation wall where the contaminated was left in-place beneath the ComEd duct bank. The containerized soil (bags) were placed within a steel covered roll-off for storage until being shipped for disposal. This roll-off was located within a fenced and secure area that was being utilized for construction equipment and materials storage.

## 2.6 Equipment Release Surveys

Excavating equipment used in the excavation of radiologically-contaminated fill was surveyed to confirm the equipment was free of radiological contaminants prior to being released from the Site. This excavation equipment within the exclusion zone had been limited to the excavation bucket used



to excavate and load the contaminated fill. The remainder of the excavator was kept outside of the exclusion zone. To confirm the absence of contaminants, the treads and other portions of the equipment where soil had accumulated, were also surveyed.

For the excavator buckets, wipes were also taken and alpha counts were measured to confirm the absence of contamination. The limits are those of 32 IAC 340 in Appendix A (33 dpm/100 cm<sup>2</sup>). However, in practice with “as low as reasonably achievable” (ALARA), the most restrictive federal level of 20 dpm/100 cm<sup>2</sup> for removable contamination from Table 1 of the Nuclear Regulatory Commission's Regulatory Guide 1.86 was used for the equipment release threshold. A copy of the alpha count survey results were well below this most restrictive level and are included in Appendix H.

## **2.7 Asbestos Air Monitoring**

Air sampling was performed by NIOSH Test Method 7400 to measure the concentration of airborne fibers associated with the remediation of asbestos contaminated soil. The sampling and analysis was performed by Carnrow, Conibear & Associates. Three air sampling units were set up around the perimeter of the exclusion zone and a forth was worn by the individual located in the vicinity of where the bags were being loaded. Each of the four samples, along with two field blanks were below the Illinois Department of Public Health (IDPH) clearance criteria. A copy of the asbestos air monitoring report is enclosed in Appendix I.

## **2.8 Personal Air Monitoring**

Personal air monitoring (PAM) was conducted on the health physicist (Glenn Huber) working in exclusion zone during the remediation activities. The PAM samples were analyzed after four days to allow for any short-lived progeny to decay. PAM data for radioactivity for the analyses are included in Appendix J. These data show no exceedances of the allowable exposure limits for this project.

## **2.9 Exclusion Zone Release**

The verification sample form for the remediation was submitted to the USEPA on May 12, 2014. USEPA released the area for backfilling on May 13, 2014 (refer to Appendix F). The remediation was backfilled shortly after being released. Prior to backfilling the steel plates along the southern edge of the excavation were removed. The orange plastic snow fencing, marking the contaminated area beneath the duct bank, was left in-place during the backfilling to serve as a marker.

### 3.0 Quantity of Radiologically-contaminated Fill Soil Removed

A total of seven (7) 1-cubic yard bulk material bags (super-sack type) were partially filled during the remediation work covered by this Report. It is estimated that during the May 11-12, 2014 remediation approximately 7 cubic yards of radiologically-contaminated fill soil was containerized. The weight of the radiologically-contaminated fill soil is estimated to be approximately 1.15 tons per cubic yard based on past projects. Therefore, a total weight of approximately 8 tons was containerized for disposal. A composite sample was collected for the contaminated fill soil placed in each bag loaded to help characterize the fill soil for disposal purposes. Nutranl results for these composites are provided in Appendix E. The average for the containerized material had a total radium activity of 40 pCi/g.

The roll-off with the bagged radiologically-contaminated fill soil was loaded on a truck for transport to the disposal site on the morning of September 26, 2014. The fill soil was shipped to the US Ecology disposal facility in Grand View, Idaho. The shipment arrived at US Ecology on October 2, 2014. A copy of the notification of initial shipment letter and copy of the manifest are included in Appendix G

**Quantity of Thorium Contaminated Soil**

<b>Disposal Location</b>	<b>Date Shipped</b>	<b>Cubic Yards</b>
U.S. Ecology, Grand View, Idaho	September 26, 2014	7
<b>Total</b>		<b>7</b>

The cost impact on the project to conduct the required radiological screening, remediation, transportation and disposal was approximately \$174,000 as of the end of October 2014. Of this total, approximately \$19,000 was spent directly for waste transportation, manifesting and disposal.

## 4.0 Radiologically-contaminated Fill Remaining On-Site

As indicated in Section 2.4, not all of the radiologically-contaminated fill soil was able to be removed. Excavation near the ComEd concrete duct along the western edge of the remedial excavation identified radiological contaminated material beneath the duct bank. Removal of the material could not be completed without risking damage to the ComEd electrical lines. Figure 1 shows the location of the area of contamination remaining on-site. The contaminated area was approximately 12-feet in length and 1-foot thick. Since it does not extend west of the duct bank (which is approximately 3-feet wide), the volume of fill soil remaining in-place is estimated at 1.3 cubic yards. This contaminated fill soil is located beneath the duct bank at a depth of approximately 5-feet below the ground surface. A photograph (#2) in Appendix E shows the location of the contamination outlined with red paint following the completion of the remedial activities.

USEPA collected a soil sample of the contaminated fill soil beneath the ComEd duct during the verification sampling event to document the level of contamination. This sample was delivered by AECOM to RSSI along with the verification sample for gamma spectroscopy. The sample collected beneath the duct bank was biased toward the more contaminated material being left in-place. The gamma spectroscopy results for contaminated samples had a total radium activity of 45 pCi/g.

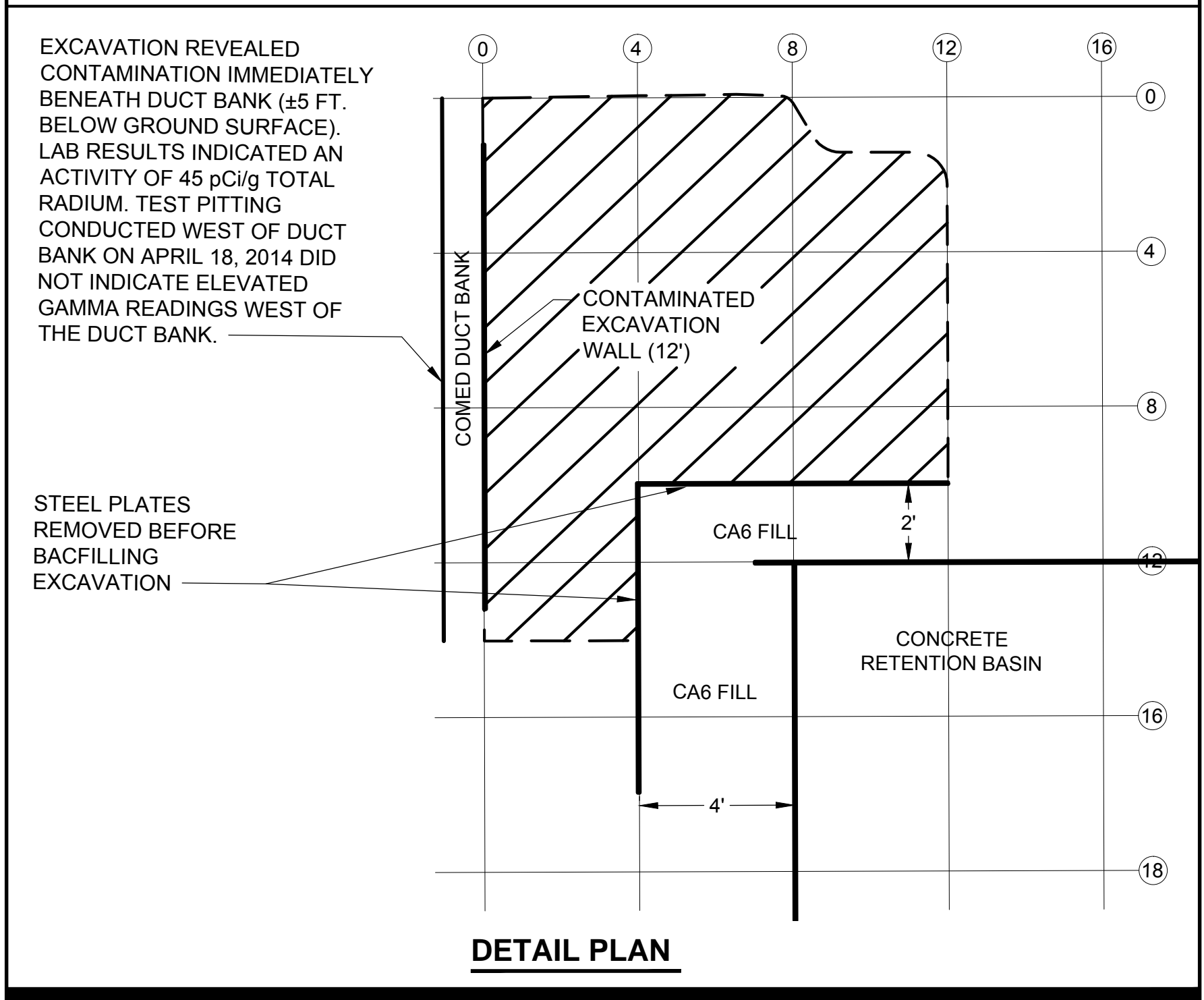
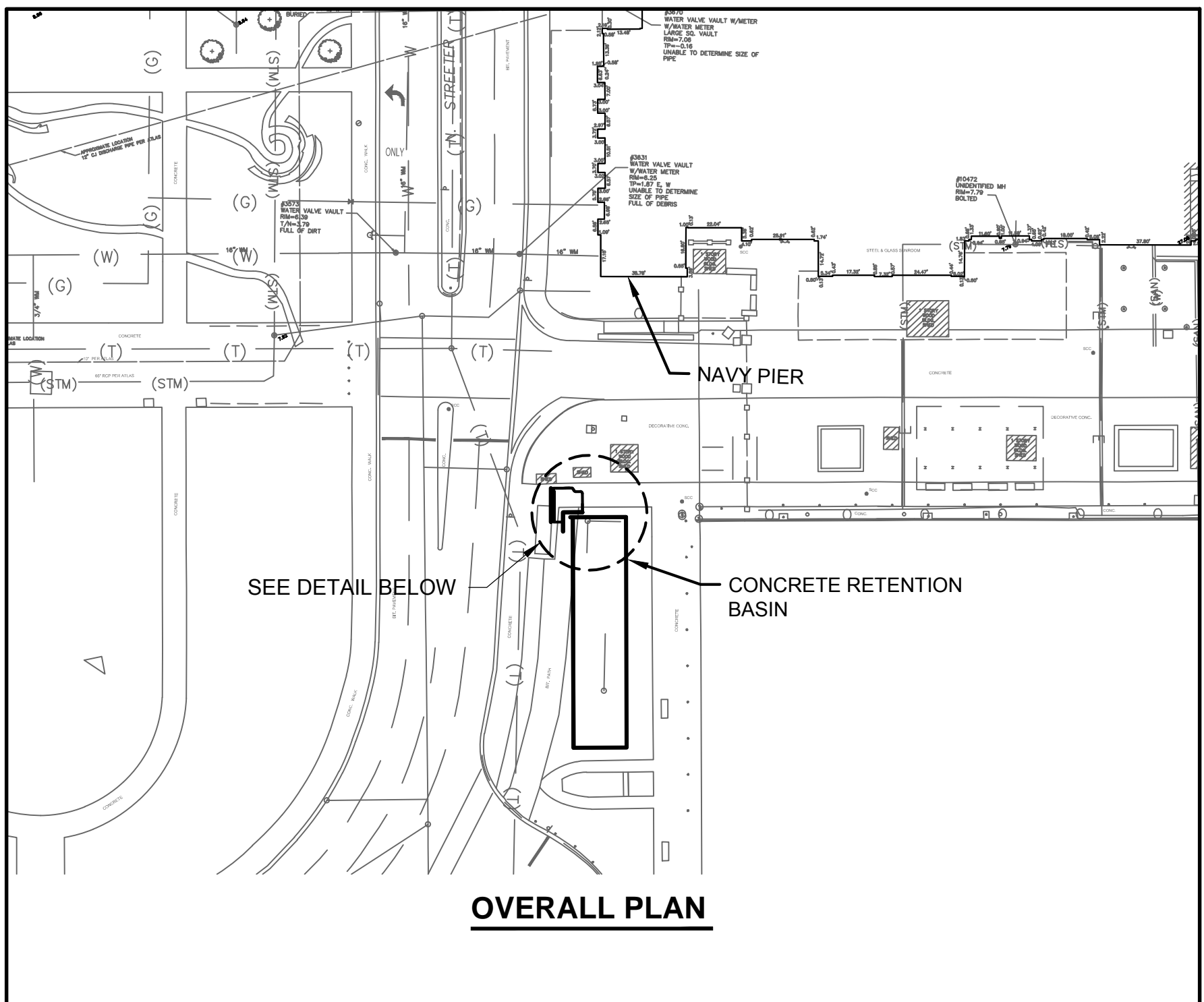
## 5.0 Summary and Conclusions

This Remedial Documentation Report provides a summary of the remediation of radiologically-contaminated fill soil subsequently identified as the result of radiological monitoring performed during the installation of a storm water retention basin. As a result, the accessible radiologically-contaminated fill soil on the Site has been remediated. This process included obtaining the verification sign-off from USEPA for the area of the Site where radiologically-contaminated fill was remediated.

On the basis of the removal and investigation actions having been completed no further removal or cleanup action is required at this time on the 600 East Grand Avenue Site. Since the entirety of the fill materials at the Site has not been screened any future disturbance of subsurface fill soil will continue to require radiological screening unless the fill soil has been previously screened.

**Figure 1**

**Remedial Excavation**



## **Appendix A**

### **Waste Character Analysis**

## **Initial Gamma Spectroscopy**



ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
RSSI Spectrum name: G140088.An1

Sample description  
G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

\*\*\*\*\* S U M M A R Y O F N U C L I D E S I N S A M P L E \*\*\*\*\*

Nuclide	Activity uCi/g	Uncertainty Counting	1 Sigma Total
PB-214	2.5683E-07	4.678E+01%	4.689E+01%
PB-212	2.0768E-05	1.499E+00%	4.004E+00%
BI-212	1.2833E-05	1.640E+01%	1.660E+01%
AC-228	8.8545E-05	1.329E+00%	2.773E+00%
Tl-210	5.0518E-07	1.266E+01%	1.316E+01%
TL-208	4.8194E-06	5.216E+00%	5.808E+00%
K-40	< 6.3768E-07		
BI-214	2.1934E-06	1.276E+01%	1.301E+01%
PB-210	< 2.1541E-05		

< - MDA value printed.

A - Activity printed, but activity < MDA.

B - Activity < MDA and failed test.

C - Area < Critical level.

F - Failed fraction or key line test.

H - Halflife limit exceeded

----- S U M M A R Y -----  
Total Activity ( 1620.5 to 1826.0 keV) 1.299E-04 uCi/g

This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
 RSSI Spectrum name: G140088.An1

Sample description  
 G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

```

***** S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide - Average ----- Peak -----
Name   Code   Activity      Energy   Activity Code MDA Value
        uCi/g      keV        uCi/g      uCi/g
-----
PB-214   N     2.5683E-07
          351.93 2.568E-07 ( 1.196E-07 4.68E+01 G
          295.22 0.000E+00 1.471E-09 0.00E+00 G
          77.11 4.869E-05 + 1.831E-06 3.62E+00 XA
          241.99 0.000E+00 3.035E-09 0.00E+00 G
          74.82 3.955E-05 + 3.715E-06 9.27E+00 XA

PB-212   N     2.0768E-05
          238.63 2.077E-05 (P 2.945E-07 1.50E+00 G
          300.09 1.153E-05 - P 1.699E-06 1.44E+01 G

BI-212   N     1.2833E-05
          727.33 1.283E-05 (P 2.073E-06 1.63E+01 G
          1620.50 1.561E-04 + 6.601E-06 5.34E+00 G
          785.37 1.034E-04 + 7.129E-06 8.31E+00 G
          893.41 0.000E+00 P 1.609E-05 1.00E+03 G

AC-228   N     8.8545E-05
          911.20 8.855E-05 ?(P 6.717E-07 1.33E+00 G
          968.97 1.103E-04 + P 1.450E-06 1.06E+00 G
          338.32 1.383E-05 - P 8.749E-07 6.14E+00 G
          964.77 4.187E-05 - P 3.626E-06 8.33E+00 G
          463.00 1.570E-05 - P 1.957E-06 1.21E+01 G

Tl-210   N     5.0518E-07
          298.00 5.163E-07 ( 6.414E-08 1.27E+01 G
          799.60 1.827E-07 & 6.109E-08 4.67E+01 G
          1210.00 7.017E-07 & 2.266E-07 4.72E+01 G
          1070.00 0.000E+00 % 1.548E-07 1.17E+02 G
          1316.00 4.632E-07 &( 2.155E-07 7.34E+01 G

TL-208   N     4.8194E-06
          583.19 4.819E-06 (P 2.445E-07 5.21E+00 G
          510.77 7.976E-06 + 5.020E-07 6.03E+00 G
          860.58 1.368E-05 + 9.574E-07 6.56E+00 G
          277.37 6.281E-06 + P 7.405E-07 1.15E+01 G
          763.13 0.000E+00 4.732E-08 0.00E+00 G

K-40     N     0.0000E+00
          1460.82 0.000E+00 ? P 6.377E-07 3.31E+01 G

BI-214   N     2.1934E-06
          609.32 1.963E-06 (P 1.464E-07 1.25E+01 G
          1764.49 2.331E-06 (P 2.957E-07 1.95E+01 G
          1120.29 2.623E-06 *(P 3.856E-07 2.73E+01 G
          1238.12 2.896E-06 &( 7.803E-07 5.13E+01 G
          768.36 1.762E-06 (P 1.364E-06 7.53E+01 G

PB-210   N     4.7027E-05
          46.54 4.703E-05 &( 2.154E-05 5.62E+01 G
( - This peak used in the nuclide activity average.

```

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
RSSI Spectrum name: G140088.An1

Sample description  
G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

\* - Peak is too wide, but only one peak in library.  
! - Peak is part of a multiplet and this area went negative during deconvolution.  
? - Peak is too narrow.  
@ - Peak is too wide at FW25M, but ok at FWHM.  
% - Peak fails sensitivity test.  
\$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.  
+ - Peak activity higher than counting uncertainty range.  
- - Peak activity lower than counting uncertainty range.  
= - Peak outside analysis energy range.  
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.  
P - Peakbackground subtraction  
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:

T - Thermal Neutron Activation  
F - Fast Neutron Activation  
I - Fission Product  
N - Naturally Occurring Isotope  
P - Photon Reaction  
C - Charged Particle Reaction  
M - No MDA Calculation  
R - Coincidence Corrected  
H - Halflife limit exceeded

Peak Codes:

G - Gamma Ray  
X - X-Ray  
P - Positron Decay  
S - Single-Escape  
D - Double-Escape  
K - Key Line  
A - Not in Average  
C - Coincidence Peak

- - - - -  
This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
 RSSI Spectrum name: G140088.An1

Sample description  
 G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

***** U N I D E N T I F I E D P E A K S U M M A R Y *****								
Peak Centroid	Background	Net Area	Intensity	Uncert	FWHM	Suspected		
Channel	Energy	Counts	Counts	Cts/Sec	1 Sigma %	keV	Nuclide	
128.40	36.46	14432.	4985.	1.385	4.73	1.803	-	s
253.66	64.41	11827.	221.	0.061	67.64	0.357	-	sc
296.03	73.93	55903.	21671.	6.020	1.69	1.222	-	D
300.00	74.75	48216.	2342.	0.651	13.42	1.221	-	D
305.32	76.01	55294.	33879.	9.411	1.12	1.224	-	D
338.45	83.33	30201.	5666.	1.574	4.54	1.230	-	D
340.37	83.76	40756.	303.	0.084	94.27	1.230	-	c
351.02	86.14	37015.	16508.	4.585	1.82	1.232	-	D
359.65	88.06	40756.	2551.	0.709	11.37	1.234	-	D
364.01	89.04	37320.	12693.	3.526	2.33	1.235	-	D
379.38	92.46	33912.	15338.	4.260	2.67	1.573	-	s
406.76	98.57	31709.	4612.	1.281	7.62	1.620	-	s
432.63	104.34	32396.	6112.	1.698	6.38	1.719	-	s
476.99	114.24	29422.	2618.	0.727	11.52	1.623	-	s
539.42	128.17	44192.	10835.	3.010	4.51	1.652	-	s
637.41	150.10	17950.	290.	0.081	65.54	1.287	-	sc
651.08	153.15	28015.	3601.	1.000	6.78	1.290	-	D
854.79	198.54	19696.	1475.	0.410	17.02	0.729	-	s
898.93	208.39	29965.	17967.	4.991	1.97	1.703	-	s
928.08	214.89	23369.	1638.	0.455	18.24	1.541	-	s
1024.49	236.40	21678.	5750.	1.597	3.85	1.360	-	D
1029.80	237.63	66537.	147738.	41.038	0.36	1.361	-	D
1041.72	240.29	90236.	14338.	3.983	3.08	1.363	-	D
1046.00	241.20	21678.	636.	0.177	32.99	1.365	-	D
1172.13	269.35	16895.	13462.	3.739	2.55	1.784	-	s
1199.22	275.39	14854.	533.	0.148	32.62	1.392	-	D
1203.50	276.49	12841.	5828.	1.619	3.05	1.393	-	D
1251.70	287.11	11018.	1367.	0.380	14.00	1.524	-	M
1303.78	298.73	12424.	430.	0.120	36.95	1.411	-	D
1305.95	299.25	11574.	9159.	2.544	1.96	1.412	-	D
1430.25	326.95	12618.	10458.	2.905	2.36	1.759	-	s
1451.10	331.60	9419.	1191.	0.331	16.04	1.393	-	
1471.91	336.25	11681.	2405.	0.668	6.67	1.442	-	D
1476.81	337.44	15337.	32416.	9.004	0.77	1.442	-	D
1537.13	350.87	7586.	1070.	0.297	11.91	1.453	-	D
1795.88	408.54	9250.	5717.	1.588	3.99	1.750	-	s
2029.72	460.73	7158.	551.	0.153	22.13	1.539	-	D
2035.35	462.06	7183.	9054.	2.515	1.69	1.540	-	D
2243.02	508.34	7475.	821.	0.228	15.29	1.576	-	D
2248.81	509.70	9523.	13031.	3.620	1.37	1.577	-	D
2442.59	552.88	2163.	184.	0.051	43.26	0.652	-	s
2481.88	561.65	6330.	1852.	0.514	10.78	1.577	-	
2568.57	581.00	6389.	2080.	0.578	5.86	1.630	-	D
2573.95	582.24	12923.	47734.	13.259	0.57	1.631	-	D
2633.35	595.46	1181.	94.	0.026	54.60	0.669	-	s
2807.25	634.27	3558.	347.	0.096	33.18	0.403	-	s
3131.47	706.64	5381.	392.	0.109	41.10	0.720	-	s
3214.19	725.11	5389.	587.	0.163	18.15	1.733	-	D
3219.52	726.35	5291.	10538.	2.927	1.38	1.734	-	D
3344.13	754.11	4802.	1710.	0.475	12.56	1.733	-	M
3381.32	762.41	3542.	1108.	0.308	11.78	1.736	-	sM
3421.49	771.45	3035.	2290.	0.636	3.99	1.765	-	D
3522.69	793.97	4051.	7153.	1.987	2.60	1.919	-	M

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
 RSSI Spectrum name: G140088.An1

Sample description  
 G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

3579.32	806.61	1569.	150.	0.042	47.11	0.396	-	sM
3658.10	824.20	810.	152.	0.042	32.62	0.435	-	s
3680.64	829.23	2244.	849.	0.236	12.64	1.870	-	s
3705.36	834.75	1937.	2468.	0.686	4.14	1.911	-	
3726.58	839.49	2046.	1283.	0.356	7.98	1.698	-	
3815.34	859.24	3131.	4870.	1.353	2.17	1.824	-	D
3860.07	869.29	591.	76.	0.021	50.91	0.361	-	s
3901.35	878.50	602.	158.	0.044	33.89	0.324	-	s
3964.96	892.40	1944.	428.	0.119	32.09	1.130	-	s
4012.38	903.29	1277.	1195.	0.332	7.48	2.185	-	
4042.96	910.12	35937.	13877.	3.855	2.11	1.858	-	D
4256.43	957.78	1088.	505.	0.140	14.56	1.454	-	sM
4283.44	963.81	4442.	5495.	1.526	2.18	1.892	-	D
4295.40	966.48	1716.	6541.	1.817	1.53	1.894	-	D
4591.62	1032.61	916.	344.	0.095	18.22	0.353	-	s
5411.09	1215.59	495.	90.	0.025	46.42	0.495	-	sM
6662.46	1495.05	782.	752.	0.209	10.27	1.870	-	
6757.00	1516.17	158.	38.	0.011	57.45	0.281	-	s
7076.01	1587.45	1079.	3274.	0.909	2.25	2.235	-	D
7095.71	1591.85	1373.	1793.	0.498	3.76	2.237	-	D

s - Peak fails shape tests.  
 D - Peak area deconvoluted.  
 L - Peak written from unknown list.  
 C - Area < Critical level.  
 M - Peak is close to a library peak.

-----  
 This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
RSSI Spectrum name: G140088.An1

Sample description  
G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

Acquisition information

Start time: 10-Apr-2014 14:05:34  
Live time: 3600  
Real time: 3747  
Dead time: 3.91 %  
Detector ID: 1

Detector system

CLTCOMP MCB 9

Calibration

Filename: G140088.An1  
12-4-13 calibration

Energy Calibration

Created: 10-Apr-2014 12:14:48  
Zero offset: 7.817 keV  
Gain: 0.223 keV/channel  
Quadratic: 1.815E-08 keV/channel^2

Efficiency Calibration

Created: 04-Dec-2013 15:23:58  
Type: Polynomial  
Uncertainty: 20.162 %  
Coefficients: 0.280573 -5.980368 1.360616  
-0.199578 0.011599 -0.000251

Library Files

Main analysis library: 1001a.Lib  
Library Match Width: 0.500  
Peak stripping: Library based

Analysis parameters

Analysis engine: Env32 G53W4.22  
Start channel: 20 ( 12.28keV )  
Stop channel: 8144 ( 1825.99keV )  
Peak rejection level: 100.000%  
Peak search sensitivity: 3  
Sample Size: 6.5360E+02  
Activity scaling factor: 1.0000E+00/( 1.0000E+00\* 6.5360E+02 ) =  
1.5300E-03  
Detection limit method: Traditional ORTEC method  
Random error: 1.0000000E+00  
Systematic error: 1.0000000E+00  
Fraction Limit: 0.000%  
Background width: best method (based on spectrum).  
Half lives decay limit: 12.000  
Activity range factor: 2.000  
Min. step backg. energy: 0.000  
Multiplet shift channel: 2.000

Corrections

	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	

ORTEC g v - i (1215) Env32 G53W4.22 10-APR-2014 15:11:24  
RSSI Spectrum name: G140088.An1

Sample description  
G140088 AECOM Soil, 653.6g

Spectrum Filename: H:\GammaVision\User\Spectra\G140088.An1

True coincidence correction:	NO	
Peaked background correction:	YES	detector 3 background 8_28_12.Pb
		24-Oct-2012 17:03:14
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc.	28	cutoff	20.00000	%
Energy Calibration				
Normalized diff:			0.4362	

Laboratory: RSSI

## **Asbestos Analysis of String Ties**



**ASBESTOS ANALYSIS BY POLARIZED LIGHT MICROSCOPY**

Method: EPA-600/M4-82-020

AECOM Environmental Group (Chgo)  
303 East Wacker Suite 909  
Chicago, IL 60601  
Phone: (312) 373-7812  
Fax: (312) 938-1109

Reference: 6031502 Date Received: 04/17/2014  
Location: Navy Pier Date Analyzed: 04/18/2014  
Batch No.: 312831 Date Reported: 04/18/2014  
Customer No.: 2879 Turn Around Time: 24 Hour

Laboratory Sample	Customer Sample Number	Asbestos Components (%)	Non-Asbestos Components (%)
312831001	NP-1	Chrysotile 20-25%	Binder 75-80%

ND = Asbestos Not Detected (Not Present) NA = Not Analyzed NS = Not Submitted

Components of inhomogeneous samples are analyzed per our Standard Operating Procedure, or per customer request.

The use of the NVLAP logo does not imply endorsement by NVLAP or any agency of the US Government.

*The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This report remains property of STAT Analysis until payment is received in full (see invoice).*

Analyzed by Name :

Henry Robitseau / Microscopist

Date: 04/18/2014

# Analysis Corporation

2242 W. Harrison, Suite 200, Chicago, Illinois 60612

Phone: (312) 733-0551 Fax: (312) 733-2386

*e-mail address: STAtinfo@STATAnalysis.com AIHA accredited 101160 NVLAP lab code 101202-0*

## CHAIN OF CUSTODY RECORD

Page: 1 of 1

Comments: ~~STAR~~ SAMPLE HAS LOW LEVEL THORIUM - QUESTIONS ARE  
STEVE KORNBERG - 262-515-7700

## **Waste Classification Analytical**

# **STAT** Analysis Corporation

2242 West Harrison St., Suite 200, Chicago, IL 60612-3766

Tel: (312) 733-0551 Fax: (312) 733-2386 STATinfo@STATAnalysis.com

Accreditation Numbers: IEPA ELAP 100445; ORELAP IL300001; AIHA 101160; NVLAP LabCode 101202-0

May 01, 2014

AECOM Environmental Group  
303 East Wacker  
Chicago, IL 60601

Telephone: (847) 279-2500

Fax: (847) 279-2510

Analytical Report for STAT Workorder: 14040802 Revision 1

RE: 6031502, Navy Pier, Chicago

Dear Steve Newlin:

STAT Analysis received 1 sample for the referenced project on 4/18/2014 11:50:00 AM. The analytical results are presented in the following report.

This report is revised to reflect additional analysis requested after the initial report was issued.

All analyses were performed in accordance with the requirements of 35 IAC Part 186 / NELAC standards. Analyses were performed in accordance with methods as referenced on the analytical report. Those analytical results expressed on a dry weight basis are also noted on the analytical report.

All analyses were performed within established holding time criteria, and all Quality Control criteria met EPA or laboratory specifications except when noted in the Case Narrative or Analytical Report. If required, an estimate of uncertainty for the analyses can be provided. A listing of accredited methods/parameters can also be provided.

Thank you for the opportunity to serve you and I look forward to working with you in the future. If you have any questions regarding the enclosed materials, please contact me at (312) 733-0551.

Sincerely,



Frank Capoccia  
Project Manager

*The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This analytical report shall become property of the Customer upon payment in full. Otherwise, STAT will be under no obligation to support, defend or discuss the analytical report.*

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**Client:** AECOM Environmental Group  
**Project:** 6031502, Navy Pier, Chicago  
**Lab Order:** 14040802

**Work Order Sample Summary**

---

<b>Lab Sample ID</b>	<b>Client Sample ID</b>	<b>Tag Number</b>	<b>Collection Date</b>	<b>Date Received</b>
14040802-001A	Navy Pier W.C.		4/18/2014 10:00:00 AM	4/18/2014

**STAT Analysis Corporation**

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Accreditation Numbers: IEPA ELAP 100445; ORELAP IL300001; AIHA 101160; NVLAP LabCode 101202-

Date Reported: May 01, 2014

Date Printed: May 01, 2014

**ANALYTICAL RESULTS**

Client: AECOM Environmental Group

Client Sample ID: Navy Pier W.C.

Lab Order: 14040802

Collection Date: 4/18/2014 10:00:00 AM

Project: 6031502, Navy Pier, Chicago

Matrix: Soil

Lab ID: 14040802-001

Analyses	Result	RL	Qualifier	Units	DF	Date Analyzed
<b>PCBs</b>						
	<b>SW8082 (SW3550B)</b>				Prep Date: <b>4/23/2014</b>	Analyst: <b>GVC</b>
Aroclor 1016	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1221	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1232	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1242	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1248	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1254	ND	0.099		mg/Kg-dry	1	4/23/2014
Aroclor 1260	ND	0.099		mg/Kg-dry	1	4/23/2014
<b>Mercury</b>						
	<b>SW7471A</b>				Prep Date: <b>4/24/2014</b>	Analyst: <b>LB</b>
Mercury	2.5	0.10		mg/Kg-dry	5	4/25/2014
<b>Metals by ICP/MS</b>						
	<b>SW6020 (SW3050B)</b>				Prep Date: <b>4/25/2014</b>	Analyst: <b>JG</b>
Arsenic	11	1.1		mg/Kg-dry	10	4/25/2014
Barium	570	1.1		mg/Kg-dry	10	4/25/2014
Cadmium	0.97	0.55		mg/Kg-dry	10	4/25/2014
Chromium	68	1.1		mg/Kg-dry	10	4/25/2014
Lead	1100	0.55		mg/Kg-dry	10	4/25/2014
Selenium	ND	1.1		mg/Kg-dry	10	4/25/2014
Silver	1.7	1.1		mg/Kg-dry	10	4/25/2014
<b>TCLP Metals by ICP/MS</b>						
	<b>SW1311/6020 (SW3005A)</b>				Prep Date: <b>4/30/2014</b>	Analyst: <b>JG</b>
Lead	0.15	0.0050		mg/L	5	4/30/2014
<b>Semivolatile Organic Compounds by GC/MS</b>						
	<b>SW8270C (SW3550B)</b>				Prep Date: <b>4/23/2014</b>	Analyst: <b>DM</b>
Acenaphthene	48	0.41		mg/Kg-dry	1	4/24/2014
Acenaphthylene	1.2	0.41		mg/Kg-dry	1	4/24/2014
Aniline	ND	4.1		mg/Kg-dry	1	4/24/2014
Anthracene	140	4.1		mg/Kg-dry	10	4/25/2014
Benz(a)anthracene	160	4.1		mg/Kg-dry	10	4/25/2014
Benzidine	ND	4.1		mg/Kg-dry	1	4/24/2014
Benzo(a)pyrene	140	4.1		mg/Kg-dry	10	4/25/2014
Benzo(b)fluoranthene	120	4.1		mg/Kg-dry	10	4/25/2014
Benzo(g,h,i)perylene	68	4.1		mg/Kg-dry	10	4/25/2014
Benzo(k)fluoranthene	88	4.1		mg/Kg-dry	10	4/25/2014
Benzoic acid	ND	10		mg/Kg-dry	1	4/24/2014
Benzyl alcohol	ND	2.1		mg/Kg-dry	1	4/24/2014
Bis(2-chloroethoxy)methane	ND	2.1		mg/Kg-dry	1	4/24/2014
Bis(2-chloroethyl)ether	ND	2.1		mg/Kg-dry	1	4/24/2014
Bis(2-ethylhexyl)phthalate	ND	10		mg/Kg-dry	1	4/24/2014
4-Bromophenyl phenyl ether	ND	2.1		mg/Kg-dry	1	4/24/2014

**Qualifiers:**

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

HT - Sample received past holding time

\* - Non-accredited parameter

RL - Reporting / Quantitation Limit for the analysis

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

H - Holding time exceeded

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Accreditation Numbers: IEPA ELAP 100445; ORELAP IL300001; AIHA 101160; NVLAP LabCode 101202-

Date Reported: May 01, 2014

Date Printed: May 01, 2014

**ANALYTICAL RESULTS**

Client: AECOM Environmental Group

Client Sample ID: Navy Pier W.C.

Lab Order: 14040802

Collection Date: 4/18/2014 10:00:00 AM

Project: 6031502, Navy Pier, Chicago

Matrix: Soil

Lab ID: 14040802-001

Analyses	Result	RL	Qualifier	Units	DF	Date Analyzed
<b>Semivolatile Organic Compounds by GC/MS</b>						
	<b>SW8270C (SW3550B)</b>		Prep Date: <b>4/23/2014</b>		Analyst: <b>DM</b>	
Butyl benzyl phthalate	ND	2.1		mg/Kg-dry	1	4/24/2014
Carbazole	52	21		mg/Kg-dry	10	4/25/2014
4-Chloroaniline	ND	2.1		mg/Kg-dry	1	4/24/2014
4-Chloro-3-methylphenol	ND	4.1		mg/Kg-dry	1	4/24/2014
2-Chloronaphthalene	ND	2.1		mg/Kg-dry	1	4/24/2014
2-Chlorophenol	ND	2.1		mg/Kg-dry	1	4/24/2014
4-Chlorophenyl phenyl ether	ND	2.1		mg/Kg-dry	1	4/24/2014
Chrysene	170	4.1		mg/Kg-dry	10	4/25/2014
Dibenz(a,h)anthracene	37	0.41		mg/Kg-dry	1	4/24/2014
Dibenzofuran	30	2.1		mg/Kg-dry	1	4/24/2014
1,2-Dichlorobenzene	ND	2.1		mg/Kg-dry	1	4/24/2014
1,3-Dichlorobenzene	ND	2.1		mg/Kg-dry	1	4/24/2014
1,4-Dichlorobenzene	ND	2.1		mg/Kg-dry	1	4/24/2014
3,3'-Dichlorobenzidine	ND	2.1		mg/Kg-dry	1	4/24/2014
2,4-Dichlorophenol	ND	2.1		mg/Kg-dry	1	4/24/2014
Diethyl phthalate	ND	2.1		mg/Kg-dry	1	4/24/2014
2,4-Dimethylphenol	ND	2.1		mg/Kg-dry	1	4/24/2014
Dimethyl phthalate	ND	2.1		mg/Kg-dry	1	4/24/2014
4,6-Dinitro-2-methylphenol	ND	4.1		mg/Kg-dry	1	4/24/2014
2,4-Dinitrophenol	ND	10		mg/Kg-dry	1	4/24/2014
2,4-Dinitrotoluene	ND	0.41		mg/Kg-dry	1	4/24/2014
2,6-Dinitrotoluene	ND	0.41		mg/Kg-dry	1	4/24/2014
Di-n-butyl phthalate	ND	2.1		mg/Kg-dry	1	4/24/2014
Di-n-octyl phthalate	ND	2.1		mg/Kg-dry	1	4/24/2014
Fluoranthene	370	4.1		mg/Kg-dry	10	4/25/2014
Fluorene	66	4.1		mg/Kg-dry	10	4/25/2014
Hexachlorobenzene	ND	2.1		mg/Kg-dry	1	4/24/2014
Hexachlorobutadiene	ND	2.1		mg/Kg-dry	1	4/24/2014
Hexachlorocyclopentadiene	ND	2.1		mg/Kg-dry	1	4/24/2014
Hexachloroethane	ND	2.1		mg/Kg-dry	1	4/24/2014
Indeno(1,2,3-cd)pyrene	58	4.1		mg/Kg-dry	10	4/25/2014
Isophorone	ND	2.1		mg/Kg-dry	1	4/24/2014
2-Methylnaphthalene	14	2.1		mg/Kg-dry	1	4/24/2014
2-Methylphenol	ND	2.1		mg/Kg-dry	1	4/24/2014
4-Methylphenol	ND	2.1		mg/Kg-dry	1	4/24/2014
Naphthalene	28	0.41		mg/Kg-dry	1	4/24/2014
2-Nitroaniline	ND	2.1		mg/Kg-dry	1	4/24/2014
3-Nitroaniline	ND	2.1		mg/Kg-dry	1	4/24/2014

**Qualifiers:**

ND - Not Detected at the Reporting Limit

J - Analyte detected below quantitation limits

B - Analyte detected in the associated Method Blank

HT - Sample received past holding time

\* - Non-accredited parameter

RL - Reporting / Quantitation Limit for the analysis

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

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**ANALYTICAL RESULTS**

Client: AECOM Environmental Group

Client Sample ID: Navy Pier W.C.

Lab Order: 14040802

Collection Date: 4/18/2014 10:00:00 AM

Project: 6031502, Navy Pier, Chicago

Matrix: Soil

Lab ID: 14040802-001

Analyses	Result	RL	Qualifier	Units	DF	Date Analyzed
<b>Semivolatile Organic Compounds by GC/MS</b>						
<b>SW8270C (SW3550B)</b>		Prep Date: 4/23/2014		Analyst: DM		
4-Nitroaniline	ND	2.1		mg/Kg-dry	1	4/24/2014
2-Nitrophenol	ND	2.1		mg/Kg-dry	1	4/24/2014
4-Nitrophenol	ND	4.1		mg/Kg-dry	1	4/24/2014
Nitrobenzene	ND	0.41		mg/Kg-dry	1	4/24/2014
N-Nitrosodi-n-propylamine	ND	0.41		mg/Kg-dry	1	4/24/2014
N-Nitrosodimethylamine	ND	2.1		mg/Kg-dry	1	4/24/2014
N-Nitrosodiphenylamine	ND	0.41		mg/Kg-dry	1	4/24/2014
2, 2'-oxybis(1-Chloropropane)	ND	2.1		mg/Kg-dry	1	4/24/2014
Pentachlorophenol	ND	0.83		mg/Kg-dry	1	4/24/2014
Phenanthrene	360	8.2		mg/Kg-dry	20	4/25/2014
Phenol	ND	2.1		mg/Kg-dry	1	4/24/2014
Pyrene	370	4.1		mg/Kg-dry	10	4/25/2014
Pyridine	ND	8.3		mg/Kg-dry	1	4/24/2014
1,2,4-Trichlorobenzene	ND	2.1		mg/Kg-dry	1	4/24/2014
2,4,5-Trichlorophenol	ND	2.1		mg/Kg-dry	1	4/24/2014
2,4,6-Trichlorophenol	ND	2.1		mg/Kg-dry	1	4/24/2014
<b>Volatile Organic Compounds by GC/MS</b>						
<b>SW8260B</b>		Prep Date: 4/18/2014		Analyst: ART		
Acetone	ND	0.080		mg/Kg-dry	1	4/25/2014
Benzene	ND	0.0053		mg/Kg-dry	1	4/25/2014
Bromodichloromethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
Bromoform	ND	0.0053		mg/Kg-dry	1	4/25/2014
Bromomethane	ND	0.011		mg/Kg-dry	1	4/25/2014
2-Butanone	ND	0.080		mg/Kg-dry	1	4/25/2014
Carbon disulfide	ND	0.053		mg/Kg-dry	1	4/25/2014
Carbon tetrachloride	ND	0.0053		mg/Kg-dry	1	4/25/2014
Chlorobenzene	ND	0.0053		mg/Kg-dry	1	4/25/2014
Chloroethane	ND	0.011		mg/Kg-dry	1	4/25/2014
Chloroform	ND	0.0053		mg/Kg-dry	1	4/25/2014
Chloromethane	ND	0.011		mg/Kg-dry	1	4/25/2014
Dibromochloromethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,1-Dichloroethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,2-Dichloroethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,1-Dichloroethene	ND	0.0053		mg/Kg-dry	1	4/25/2014
cis-1,2-Dichloroethene	ND	0.0053		mg/Kg-dry	1	4/25/2014
trans-1,2-Dichloroethene	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,2-Dichloropropane	ND	0.0053		mg/Kg-dry	1	4/25/2014
cis-1,3-Dichloropropene	ND	0.0021		mg/Kg-dry	1	4/25/2014
trans-1,3-Dichloropropene	ND	0.0021		mg/Kg-dry	1	4/25/2014

**Qualifiers:**  
ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
HT - Sample received past holding time  
\* - Non-accredited parameter

RL - Reporting / Quantitation Limit for the analysis  
S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range  
H - Holding time exceeded



**STAT Analysis Corporation**

2242 West Harrison St., Suite 200, Chicago, IL 60612-3766

Tel: (312) 733-0551 Fax: (312) 733-2386 STATinfo@STATAnalysis.com

Accreditation Numbers: IEPA ELAP 100445; ORELAP IL300001; AIHA 101160; NVLAP LabCode 101202-

Date Reported: May 01, 2014

Date Printed: May 01, 2014

**ANALYTICAL RESULTS**

Client: AECOM Environmental Group

Client Sample ID: Navy Pier W.C.

Lab Order: 14040802

Collection Date: 4/18/2014 10:00:00 AM

Project: 6031502, Navy Pier, Chicago

Matrix: Soil

Lab ID: 14040802-001

Analyses	Result	RL	Qualifier	Units	DF	Date Analyzed
<b>Volatile Organic Compounds by GC/MS</b>	<b>SW8260B</b>				Prep Date: 4/18/2014	Analyst: ART
Ethylbenzene	ND	0.0053		mg/Kg-dry	1	4/25/2014
2-Hexanone	ND	0.021		mg/Kg-dry	1	4/25/2014
4-Methyl-2-pentanone	ND	0.021		mg/Kg-dry	1	4/25/2014
Methylene chloride	ND	0.011		mg/Kg-dry	1	4/25/2014
Methyl tert-butyl ether	ND	0.0053		mg/Kg-dry	1	4/25/2014
Styrene	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,1,2,2-Tetrachloroethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
Tetrachloroethene	ND	0.0053		mg/Kg-dry	1	4/25/2014
Toluene	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,1,1-Trichloroethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
1,1,2-Trichloroethane	ND	0.0053		mg/Kg-dry	1	4/25/2014
Trichloroethene	ND	0.0053		mg/Kg-dry	1	4/25/2014
Vinyl chloride	ND	0.0053		mg/Kg-dry	1	4/25/2014
Xylenes, Total	ND	0.016		mg/Kg-dry	1	4/25/2014
<b>Percent Moisture</b>	<b>D2974</b>				Prep Date: 4/28/2014	Analyst: SDA
Percent Moisture	20.4	0.2	*	wt%	1	4/28/2014

**Qualifiers:**

ND - Not Detected at the Reporting Limit  
J - Analyte detected below quantitation limits  
B - Analyte detected in the associated Method Blank  
HT - Sample received past holding time  
\* - Non-accredited parameter

RL - Reporting / Quantitation Limit for the analysis  
S - Spike Recovery outside accepted recovery limits  
R - RPD outside accepted recovery limits  
E - Value above quantitation range  
H - Holding time exceeded

[illegible]

## Sample Receipt Checklist

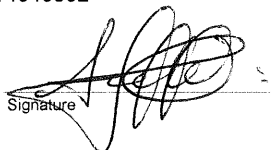
Client Name **AECOM**

Date and Time Received: **4/18/2014 11:50:00 AM**

Work Order Number **14040802**

Received by: **DO**

Checklist completed by:

  
Signature

**4/18/14**  
Date

Reviewed by:

**FC**  
Initials

**4/28/14**  
Date

Matrix:

Carrier name Client Delivered

Shipping container/cooler in good condition?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Not Present <input type="checkbox"/>
Custody seals intact on shipping container/cooler?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Custody seals intact on sample bottles?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Not Present <input checked="" type="checkbox"/>
Chain of custody present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody signed when relinquished and received?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Chain of custody agrees with sample labels/containers?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Samples in proper container/bottle?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sample containers intact?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Sufficient sample volume for indicated test?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
All samples received within holding time?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Container or Temp Blank temperature in compliance?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Temperature On Ice °C
Water - VOA vials have zero headspace?	No VOA vials submitted <input type="checkbox"/>	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Water - Samples pH checked?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Checked by: _____
Water - Samples properly preserved?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	pH Adjusted? _____

Any No response must be detailed in the comments section below.

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Client / Person  
contacted: \_\_\_\_\_

Date contacted: \_\_\_\_\_

Contacted by: \_\_\_\_\_

Response: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Frank Capoccia

---

**From:** Newlin, Steve [Steve.Newlin@aecom.com]

**Sent:** Friday, April 18, 2014 2:05 PM

**To:** Frank Capoccia

**Cc:** Kornder, Steve

**Subject:** Navy Pier W.C. Analysis

Frank,

I dropped off a soil sample today with the Sample ID: **Navy Pier W.C.** (COC # 853916).

We need to have that sample run for the following parameters:

- VOCS
- SVOCs
- RCRA Metals
- PCBs

The sample should be run on the normal one week turn around. Can you also retain some of the sample in case we need to run some follow-up analysis (i.e. TCLP) based on the total results? Feel free to give me a call with any questions.

**Steve Newlin**  
**Senior Project Manager**  
**Environment**  
**D 312.373.7782 C 847.687.8095**  
**steve.newlin@aecom.com**  
**AECOM**  
**303 E. Wacker Drive, Suite 1400**  
**Chicago, IL 60601**  
**T 312.373.7700 F 312.373.6800**  
**www.aecom.com**

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 Please consider the environment before printing this e-mail.

## Frank Capoccia

---

**From:** Newlin, Steve [Steve.Newlin@aecom.com]

**Sent:** Tuesday, April 29, 2014 3:19 PM

**To:** Frank Capoccia

**Cc:** Kornder, Steve

**Subject:** RE: Navy Pier Analysis STAT 14040802

Frank,

Given the elevated lead concentration, can you expedite TCLP analysis on this sample to determine if it is hazardous or not? How soon could you have that done?

**Asbestos Analysis of Overburden  
(Non-Radiologically Contaminated Fill Soil)**

**ASBESTOS ANALYSIS BY POLARIZED LIGHT MICROSCOPY**

Method: EPA-600/M4-82-020

AECOM Environmental Group (Chgo)

303 East Wacker Suite 909

Chicago, IL 60601

Phone: (312) 373-7812

Fax: (312) 938-1109

Reference: PO#53691ACM/60312502.300

Location: Navy Pier Chicago, IL

Batch No.: 313233

Customer No.: 2879

Date Received: 05/08/2014

Date Analyzed: 05/08/2014

Date Reported: 05/08/2014

Turn Around Time: 24 Hour

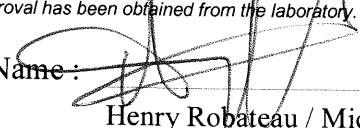
Laboratory Sample	Customer Sample Number	Asbestos Components (%)	Non-Asbestos Components (%)
313233001	A-1-W	ND	Other 99-100%

ND = Asbestos Not Detected (Not Present)    NA = Not Analyzed    NS = Not Submitted

Components of inhomogeneous samples are analyzed per our Standard Operating Procedure, or per customer request.

The use of the NVLAP logo does not imply endorsement by NVLAP or any agency of the US Government.

The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This report remains property of STAT Analysis until payment is received in full (see invoice).

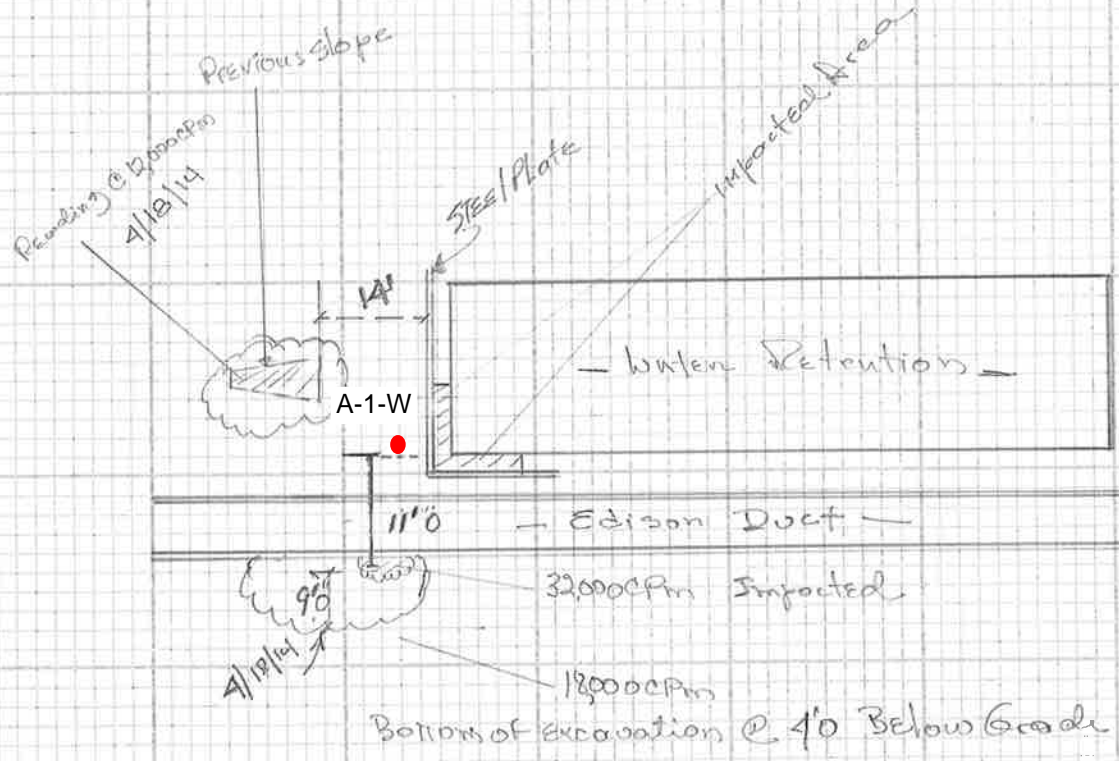
Analyzed by Name: 

Henry Robateau / Microscopist

## Page: 1 of 1

[illegible]





NAVY Pier # 60312 502

● Overburden Asbestos Sample

## **Nutranl Composite Samples for Bagged Soil**

## Gamma Spec Report - AECOM Navy Pier

Stan A. Huber Consultants, Inc.  
200 North Cedar Road  
New Lenox, IL 60451  
(800) 383-0468

### Instrument ID:

Canberra Genie 2000 NaI Gamma Spec System  
2"x2" NaI detector w/ pulse height analysis software package

### Summary Report - Samples Collected on May 11 and May 12, 2014

Sample ID	Analysis Date	Sample Group	Description	Weight (g)	U-238** Activity	U-238 Uncertainty	Th-232 Activity	Th-232 Uncertainty	Ra-226 Activity	Ra-226 Uncertainty	Total Radium Activity	Total Radium Uncertainty
4007	5/13/2014	background	bkg051314	7.5	-1.29	2.9	0.32	0.9	-0.03	1.26	0.29	1.55
4008	5/13/2014	soil standard	soilstd051314	36.9	0.1	5.82	5.25	1.8	2.67	2.3	7.92	2.92
4009	5/13/2014	AECOM Navy Pier	S6781 Bag Sample 01	26.2	-18.88	11.74	43.98	3.57	-4.45	4.21	39.53	5.52
4010	5/13/2014	AECOM Navy Pier	S6782 Bag Sample 02	26.5	-65.18	23.6	96.54	7.2	-4.83	8.52	91.71	11.15
4011	5/13/2014	AECOM Navy Pier	S6783 Bag Sample 03	25.5	-50.37	12.53	61.04	3.86	-4.83	4.59	56.21	6.00
4012	5/13/2014	AECOM Navy Pier	S6784 Bag Sample 04	29.1	-30.31	12.65	43.03	3.93	-1.18	4.7	41.85	6.13
4013	5/13/2014	AECOM Navy Pier	S6785 Bag Sample 05	38.7	-12.49	9.83	27.07	3.01	-3.06	3.54	24.01	4.65
4014	5/13/2014	AECOM Navy Pier	S6786 Bag Sample 06	34.9	-3.81	5.02	10.43	1.58	0.53	1.95	10.96	2.51
4015	5/13/2014	AECOM Navy Pier	S6787 Bag Sample 07	31	-10.85	9.87	15.81	3.07	0.28	3.76	16.09	4.85

All results are in pCi/gram

\*\* Important Note: System has not been calibrated for U-238 and the analytical results detailed above for U-238 should not be used or considered accurate

Note: Negative Ra-226 concentrations indicative of dominant Th-232 concentration. Pulse height analysis software considers multiple overlapping regions of interest, which can result in incorrect count allocations between Th-232 and Ra-226. Overall Total Radium concentration data should still be considered accurate. GAH 5/13/14

Analyzed By: \_\_\_\_\_

Date: May 13, 2014

## **Dose Rate and Wipe Surveys for Bagged Soil**



## **Appendix B**

### **Work Plan**



AECOM  
303 E. Wacker Drive, Suite 1400  
Chicago, Illinois 60601

312-373-7700 tel  
312-373-6800 fax

May 8, 2014

Ms. Verneta Simon, On-Scene Coordinator  
US Environmental Protection Agency - Region 5  
77 W. Jackson Blvd., SE-5J  
Chicago, Illinois 60604-3590

RE: Scope of Work  
Fill Soil Radiological Assessment and Compliance  
600 E. Grand Ave, Chicago, Illinois

Dear Ms. Simon:

This Scope of Work describes the fill soil radiological assessment and compliance activities that will be performed in response to the discovery of radiologically contaminated fill soil at the 600 E. Grand Avenue property located in Chicago, Illinois (referred to as "Site"). The intent of these activities is to conduct gamma screening and remedial activities for radiologically contaminated fill soil as provided by Task 6 of the City of Chicago Tronox/Streeterville Removal Response Cooperative Agreement ("Cooperative Agreement"). Further, all work conducted will follow the requirements of the Streeterville Thorium Quality Assurance Project Plan UFP-QAPP dated July 8, 2013, Rev. 1.2 ("QAPP"). Those QAPP requirements provide, inter alia, that all work conducted pursuant to this scope of work shall comply with the notice, approval, reporting, and health and safety plan (HASP) requirements of the Cooperative Agreement.

## BACKGROUND

Early in the afternoon of April 9, 2014, AECOM observed a thin reddish orange fill soil layer with elevated gamma readings, while screening for the excavation and installation of a storm water retention basin. The layer was encountered at a depth of approximately 5-6 feet below the ground surface, while benching along the perimeter of the excavation. The maximum gamma reading observed was 101,000 counts per minute (cpm) unshielded. For reference, the field instrument threshold of 18,774 cpm is equivalent to the United State Environmental Protection Agency (USEPA) cleanup value of 7.1 pico-Curies per gram (pCi/g) total radium. A phone call to Eugene Jablonowski (USEPA) was made early in the afternoon to provide notification of the discovery and an email including photos and a sketch was sent to the USEPA later that same afternoon.

There are several feet of fill soil that is not radiologically contaminated in-place above the contaminated fill layer and the excavation is within a fenced/restricted construction area. A couple of steel plates were pushed into the ground to prevent direct contact and minimize the contaminated fill from sliding into the excavation and also allow construction work to continue within the adjacent excavation. The contamination appears to be a layer about 4-6 inches thick that extends approximately 7-9 feet horizontally along the excavation wall. Further excavation was halted so as not to disturb what appeared to be thorium contaminated fill soil. No contaminated soils were excavated and no excavation of contaminated material will be necessary to complete the current construction activities.

The USEPA visited the Site between 8:00 and 8:30AM on Thursday April 10, 2014. At the request of the USEPA, AECOM collected a sample of the contaminated material for gamma spectroscopy analysis. The sample was transported to RSSI in Morton Grove, Illinois for analysis later that day. The results of the gamma spectroscopy analysis were received on Friday, April 11, 2014. The results indicated a radium-228 activity of 88.5 pCi/g and a relatively low radium-226 activity of 2.19 pCi/g (based on bismuth-214). Therefore, this appears consistent with contamination from Lindsay Light. This gamma spectroscopy information was also provided to the USEPA.

Several test pits were excavated on the morning of Friday April 18, 2014. These test pits were excavated to the north and west of the area of known thorium contamination to delineate the extent of the contamination (i.e., knowing that it is already delineated to the east and south). The plan was to excavate each test pit to just beyond the depth of original contamination. If any elevated gamma readings were observed, the test pit was to be abandoned before excavation of the contaminated fill soil and another test pit would be excavated slightly beyond the initial test pit location.

No contaminated fill soil was excavated during the test pit delineation process and the boundaries of the area of thorium contamination were able to be delineated (refer to the attached Figure). Fill soil excavated from each test pit was returned to the excavation immediately after completing the delineation efforts. A small portion of the sample submitted for gamma spectroscopy was also submitted to STAT Analysis Corp. (STAT) to determine whether the sample contained asbestos. The sample contained fill soil as well as short strings that were observed to be present in the gamma spectroscopy sample. Lab results from STAT were received late in the afternoon of Friday, April 18, 2014. The results of the polarized light microscopy (PLM) indicated the strings were approximately 20-25% chrysotile (refer to attached lab report).

The asbestos containing string ties appear directly related to the mantles, which are detectable via gamma surveying. Therefore, removal of the thorium contaminated fill soil is expected to effectively remove the mantle related asbestos. However, the presence of asbestos will require the slight modifications to the plans and procedures historically utilized for thorium contaminated fill soils. It is anticipated that the plans and procedures included in this document will be modified slightly as the asbestos requirements are better defined.

## **METHODS**

### **Excavation of Radiologically-Contaminated Fill Soil**

The remediation process will follow QAPP Standard Operating Procedures (SOPs) and Safe Work Practices (SWPs), including but not limited to Field Sampling and HASP. The QAPP identifies a Project Action Level of 7.1 pCi/g.

The remediation/excavation areas will be designated Exclusion Zones for purposes of health and safety requirements until such time as the contaminated soil identified above the Project Action Level is removed from the excavation areas, loaded into bulk containers (e.g., Super Sack® type), and the areas are released by the USEPA.

The project activities will include the removal of the radiologically-contaminated fill soil. However, a ComEd duct bank may run over/above the radiological-contamination on the western edge of the contaminated area. For safety reasons, excavation beneath the ComEd duct bank is not planned and contamination may be left in place. The locations of any contaminated material that would remain will be discussed with the USEPA prior to any backfilling activities.

The excavation process will utilize a small excavator or backhoe with a maximum bucket volume of one cubic yard or less. This bucket size will facilitate loading of bulk containers without spilling and/or spreading the contamination. The contaminated fill soil will be loaded directly into Super Sack® type containers. The shipping container (Super Sack® type bags) exteriors, and any equipment that comes in direct contact with the contaminated soil, will be confirmed clean prior to leaving the Site in accordance with the applicable SWP-345. It is anticipated that it will be necessary to temporarily store radiologically-contaminated fill soil in Super Sack® type containers on the property until final disposal arrangements can be completed. Stored soil will be properly secured with fencing and placarded with appropriate warning signs for asbestos and Streeterville radiologically-contaminate soils.



Prior to conducting the remediation of the radiologically-contaminated fill soil, a sample of the fill soil that is not radiologically contaminated (i.e., the overburden) will be collected to confirm the absence of asbestos. Assuming that there is no issue with asbestos, the fill soil that is not radiologically contaminated will be staged in a stockpile adjacent to the remedial excavation or in a roll-off box that can be moved and stored in a secure area if there is insufficient space to stockpile adjacent to the excavation. This overburden will either be disposed offsite or placed back within the excavation after the remedial activities have been completed and the area has been released for unrestricted use by the USEPA.

The excavation of radiologically-contaminated fill above the Project Action Level will be confirmed by surveys conducted during the excavation process. To conduct the remediation in a more efficient manner, the collection of a confirmation/pre-verification sample may be skipped. Therefore, a final field gamma survey at the base of the excavation will be conducted to confirm the absence of elevated gamma readings indicative of radiological contamination. If no elevated gamma readings are observed, the USEPA will be notified and the excavation will be subject to verification survey(s) and sampling by USEPA, in accordance with the SWP-214.

Samples will also be collected and analyzed to determine if the remediation of asbestos is complete since it has also been identified as a potential contaminant. Sample will be collected from the eastern, northern and western sidewalls as well as the base of the excavation and analyzed for asbestos. The results of the asbestos analysis will be submitted to the USEPA along with the total radium results of the analysis of the verification samples.

During non-work hours, the remediated surface will be covered with a layer of plastic sheeting or geotextile until the analytical results are available and the area has been released by the USEPA for unrestricted use.

#### **Project Action Level/Applicable Cleanup Level**

Based upon 40 CFR 192, the USEPA has set the cleanup level as 5 pCi/g total radium (Ra-226 and Ra-228) above the background. A level of 2.1 pCi/g total radium is currently considered background for the Streeterville Investigation Area by the USEPA. Thus, radiologically-contaminated material is defined by the USEPA for the Streeterville Investigation Area as exceeding a threshold of 7.1 pCi/g total radium. The QAPP refers to the 7.1 pCi/g threshold as the "Project Action Level."

Field measurements will be taken of gamma radiation levels using a Ludlum 2221 scaler-ratemeter and a 2 x 2-inch sodium iodide (NaI) detector. The equipment will be calibrated to determine the gamma count in counts per minute (cpm) that is equivalent to 7.1 pCi/g. Equipment calibration will be performed at least annually using the thorium calibration blocks at the former Tronox West Chicago Rare Earth Facility.

Prior to the initiation of activities, gamma count rate background levels shall be established for each applicable survey instrument. Three locations shall be chosen in non-radiologically-contaminated areas of the Site. A one-minute integrated count shall be obtained at the surface of each location, for each survey instrument (Ludlum 2221 with 2" x 2" NaI probe). The measurements collected from each location will be averaged to establish instrument specific background gamma count rates.

#### **Gamma Screening Procedures**

Screening will be performed in accordance with the applicable procedures as outlined in SWP-210. Gamma screening will be performed using an unshielded 2 x 2-inch sodium iodide (NaI) gamma detector and a Ludlum Model 2221 scaler-ratemeter calibrated to the thorium calibration blocks at the former Tronox West Chicago Rare Earth Facility. Values will be recorded in cpm.

The approximate boundaries of the radiological contamination (Exclusion Zone) have been defined by the absence of elevated gamma readings in other excavation activities conducted in the vicinity of the area of contamination. During the remediation process, the base of the excavation (exposed surface fill soil) will

be screened using a walk-over survey methodology with a shielded 2 x 2-inch probe. The overburden that is not radiologically contaminated will be removed in lifts of 18-inches or less. Procedures for the handling and the management of the asbestos containing fill soil will be implemented prior to the excavation of the radiologically contaminated fill soil since the asbestos appears to be related to the asbestos containing string ties that are visible within the thorium contaminated fill soil. The asbestos related work is being performed by SET Environmental, Inc. (a licensed asbestos abatement contractor). In addition, the sidewalls of the excavation will also be surveyed. If radiologically-contaminated fill soil in excess of the Project Action Level is identified, these areas will be included within and designated as part of the Exclusion Zone. As described in the HASP, unless a barrier is in place, Exclusion Zones will require appropriate PPE and personal air monitoring to enter. All equipment and personnel that enter an Exclusion Zone will be surveyed to verify they are clean upon leaving the Exclusion Zone. Personnel entering Exclusion Zones must be 40-hour health and safety trained.

### **Materials Management**

Fill soil from the Site that is not radiologically-contaminated above the Project Action Level may be replaced in their original locations. If not needed as backfill, fill soil that is not radiologically contaminated above the Project Action Level may be designated to be removed from the Site and will be disposed of in accordance with applicable regulations as necessary.

Fill soil contaminated above the Project Action Level may also be temporarily stored on-site in Super Sack® type containers pursuant with USEPA approval. Fill soil that is contaminated above the Project Action Level will ultimately be sent to an appropriate commercial disposal facility.

### **Decontamination**

All discarded materials, waste materials, and other field equipment and supplies will be handled in such a way to prevent the potential spread of contamination during excavation and restoration activities. Discarded items that have contacted contaminated materials will be containerized and stored for disposal at the permitted commercial disposal facility. Non-contaminated items to be discarded will be collected for disposal as general refuse waste.

### **HEALTH AND SAFETY PLAN (HASP) SUMMARY**

All work, including survey activities, will be conducted in accordance with the QAPP and Site HASP. The HASP addresses required training, personnel protection equipment, general work precautions, and medical monitoring among other issues. In general, as radiologically-contaminated soil above the Project Action Level is detected, the areas will be designated as Exclusion Zones and will require appropriate PPE and personal air monitoring to enter. All equipment and personnel that enter an Exclusion Zone will need to be frisked/surveyed to verify they are clean upon leaving the Exclusion Zone. Personnel entering Exclusion Zones must be 40-hour health and safety trained.

### **Potential Hazards**

Potential hazards that could be encountered during the removal activities include contact with contaminated materials and the hazards associated with construction work. Contaminants of concern include the entire decay series for Thorium-232 and Uranium-238. Radiological and air monitoring as described in this letter will be performed during excavation to define the presence of radiological contaminants.

In addition, it appears that the source of the thorium contamination was likely actual mantle materials, including asbestos string ties that were likely used to secure the mantle to the gas lamps. Therefore, this work plan will be modified to account for the presence of asbestos. Specifically, remedial work within the Exclusion Zone will be required to utilize a licensed asbestos abatement company and certified

personnel. However, the primary exposure routes of concern for asbestos and radiological contamination are similar (i.e., inhalation and ingestion).

The mechanisms for exposure to the radiologically-contaminated soil material are direct exposure, inhalation, ingestion and eye/skin contact. The primary mechanism of exposure is direct exposure to external gamma radiation. Workers will be instructed in appropriate measures to protect against exposure to the above materials, and PPE will be worn until monitoring shows PPE is not necessary. Physical hazards which might be encountered at this Site include but are not limited to the following:

- Construction equipment (front-end loaders, track excavators, trucks, compactors, bulldozers);
- Power tools (saws, drills, jack hammers, compactors);
- Heat and cold stress;
- Overhead power lines;
- Excavations;
- Confined space;
- Noise;
- Demolition of structures;
- Slip, trip, and fall conditions, especially during wet or freezing periods; and
- Buried utilities which may or may not be "live."

Additional details on these and other safety provisions are addressed in the HASP.

### **Training and Communications**

Site and project specific radiation and health and safety training will be provided by Stan A. Huber Consultants Inc. (Huber) for all on-site personnel prior to working on the Site. All personnel required to work in the Exclusion Zone or Contamination Reduction Zone will complete training conforming to the requirements of 29 CFR 1910.120(e) including 40-hours of initial hazardous waste site worker training. Where appropriate, they will have 8-hours of annual refresher training, and 8-hour supervisor training as appropriate. Remedial work within the Exclusion Zone will be required to utilize a licensed asbestos abatement company and certified personnel.

All site personnel will be trained and briefed on radiation basics, anticipated hazards, equipment to be worn, safety practices to be followed, contamination prevention practices, emergency procedures, radiation basics, and communications. Procedures for leaving the Exclusion Zone will be planned and implemented prior to going on-site. Work Areas and decontamination procedures will be established based on expected site conditions, and updated as necessary during construction. Other guidelines such as heat and cold stress, excavation safety and confined space are included within the HASP.

In addition to this formal health and safety training, "tailgate" safety meetings will be held daily, or more frequently, dependent on safety issues arising during the project. These meetings may be led by the field team leader or the worker's foremen, and every employee must sign in before beginning work. The subjects covered and the persons present will be recorded for each meeting and kept as part of the project records. Health and safety incidents and monitoring results will be discussed in the tailgate safety meetings, when appropriate.

### **Personal Protective Equipment**

Disposable coveralls, steel-toed work shoes, boot covers, hard hat, safety glasses, and gloves will also be required in all Exclusion Zones. Prior to exiting any Exclusion Zones, personnel will pass through decontamination, disposal of all appropriate PPE, and frisking/surveying procedures as described in the HASP. Personnel operating in Exclusion Zones will be required to have personal air monitors (PAMs).

Since asbestos appears to be involved, procedural changes or control measures, such as wetting of soils, will be employed and it is believed that PAMs will also be worn for airborne asbestos monitoring. It is also anticipated that respiratory protective equipment will be required for those working in the Exclusion Zone.

### **Air Quality Monitoring**

The principal objectives of the air monitoring activities are to:

- Ensure worker and general population safety and provide radiological control information;
- Evaluate work procedures and site control measures. In addition to identifying the need for corrective action, air monitoring also documents the effectiveness of such control actions;
- Measure releases of airborne radioactivity (should any occur) and ensure that people living and working in the surrounding area are not exposed to radiation above acceptable limits.

A primary requirement of dust control is “no visible dust” during activities associated with contaminant removal. The excavation (remediation) and soil handling areas where contaminated soil is present will be required to have no visible dust. Fugitive dust generation is caused by a range of activities including excavation, loading, dumping, transporting and scraping using heavy equipment such as bulldozers, front-end loaders, trucks and graders.

Air monitoring is conducted for the purpose of documenting and, if detected, initiating measures to control airborne contamination. High volume air sampling equipment has been used in the past for large scale thorium remediation efforts in Streeterville and has not indicated issues. Therefore, it is apparent that control measures are appropriate for controlling fugitive dust issues and that the high volume air sampling provides little or no benefit on this limited project. Relative to large scale remediation projects, the volume of contaminated soil that will be excavated is minimal (measured in 10-15 cubic yards rather than hundreds of yard), and where previous efforts have involved the use of an excavator with a one cubic yard bucket, plans for this project will involve a smaller excavator/backhoe. Thus, the potential opportunity to create a fugitive dust issue will be reduced significantly from that of the large scale project. As such, no high volume air sampling is proposed and air monitoring will only be conducted at a personnel level.

During the excavation and handling of radiologically-contaminated materials, the procedures to be followed to control dust will include traffic speed control and use of water to keep soils moist. Excavated radiologically-contaminated soil above the Project Action Level will be loaded directly into the Super Sack® type containers as the material is excavated. Radiologically-contaminated material stored on-site will be stored in Super Sack® type containers. Because of the potential for asbestos, these will also be required to be labeled and stored according to the applicable asbestos regulations.

### **Personal Exposure Monitoring**

Personnel operating in Exclusion Zones will be required to have personal air monitors (PAMs). Procedures for personal air monitoring for the thorium are discussed in the HASP and SWP-212. Lapel samplers worn for personal air monitoring will be utilized for airborne radioactivity monitoring. Air filters will be analyzed by Huber on a daily basis and additional evaluation of samples will be performed when determined necessary based on elevated results. Because of the short duration and limited extent of the remedial activities, dose rates for individuals working within the Exclusion Zones will be derived by conducting exposure measurements with a Bicon MicroRem, which is a tissue-equivalent scintillator accurate for low level dose rate measurements.

Since asbestos appears to be involved, it is believed that PAMs will also be worn for airborne asbestos monitoring. It is also anticipated that respiratory protective equipment will be required for those working in the Exclusion Zone. SET, or their subcontractors, will be responsible for implementing asbestos related procedures including asbestos related air monitoring and PAM analysis.

## **Verification Sampling**

The excavation of radiologically contaminated fill above the Project Action Level will be confirmed by gamma surveys conducted during the excavation process. To conduct the remediation in the most efficient manner, no pre-verification sample will be collected. However, a final field gamma survey at the base of the excavation will be conducted to confirm the absence of elevated gamma readings indicative of radiological contamination. If no elevated gamma readings are observed, AECOM will notify the USEPA. The USEPA will conduct verification survey(s) and sampling of the excavation.

It is anticipated that the size of the final remediation area will require one verification sample for thorium. The volume of the verification soil sample will be sufficient to fill a 2-ounce jar and a 500-ml marinelli container provided by RSSI. AECOM will submit the 2-ounce jar to STAT for asbestos analysis. AECOM will submit the sealed marinelli to RSSI for the gamma spectroscopy analysis. USEPA will also collect a 2-ounce sample jar from each remedial excavation sidewall (i.e., eastern, northern and western sidewalls). No sample is being collected on the southern sidewall since a steel plate was placed along the southern boundary of the contaminated zone. AECOM will submit these three samples to STAT for asbestos analysis. USEPA, or persons designated by the USEPA, will collect the asbestos samples at the same time as the verification sample.

AECOM will submit a verification signoff form along with the gamma spectroscopy results to the USEPA if the results indicate the verification sample total radium activity is less than 7.1 pCi/g. The request for the release of the excavation for backfilling will be based on the radiological results. The removal of the thorium contaminated fill soil is expected to accomplish the removal of the string tie related asbestos.

USEPA approval will be sought if it appears that thorium contaminated fill soil will remain in-place. USEPA will collect representative samples for gamma spectroscopy and asbestos analyses (utilizing the same volume as the verification sample) of any material that will remain in place. A marker layer, such as plastic snow fence or plastic sheeting, will be put in-place to mark the boundary of the contaminated fill soil. AECOM will submit these samples for gamma spectroscopy and asbestos analysis. AECOM will provide these results to the USEPA along with the verification sample results.

The RSSI 500-ml marinelli sample(s) will be transferred to the USEPA per their request.

## **COMPLETION DOCUMENTATION**

An objective of this action is to document the screening activities, as well as the identification and handling of radiologically contaminated soil during these initial activities. The following types of data will be generated during the project:

- Surface gamma survey records;
- Soil sampling records (if performed);
- Fixed laboratory soil analyses data, if performed;
- Air quality (personnel) sampling/analytical records.

The results of this investigation work will be presented in a letter report. The report will provide a summary of the remediation activities conducted at the Site and any locations of radiologically contaminated material remaining above the Project Action Level. The report will include field data, laboratory results, documentation of the volume of material removed, and its disposal location. The draft report will be submitted within 45 days of completion of the work and on-site investigations. AECOM will incorporate USEPA's comments, if any, and submit the final report within 15 days of receiving USEPA's written comments on the draft report.

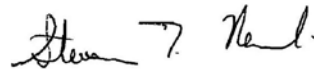
We thank you again for your cooperation and rapid response as we initiate this project.

Yours sincerely,

AECOM Technical Services, Inc.



Steven C. Kornder, Ph.D.  
Senior Project Manager



Steve Newlin  
Senior Project Manager

Attachments:

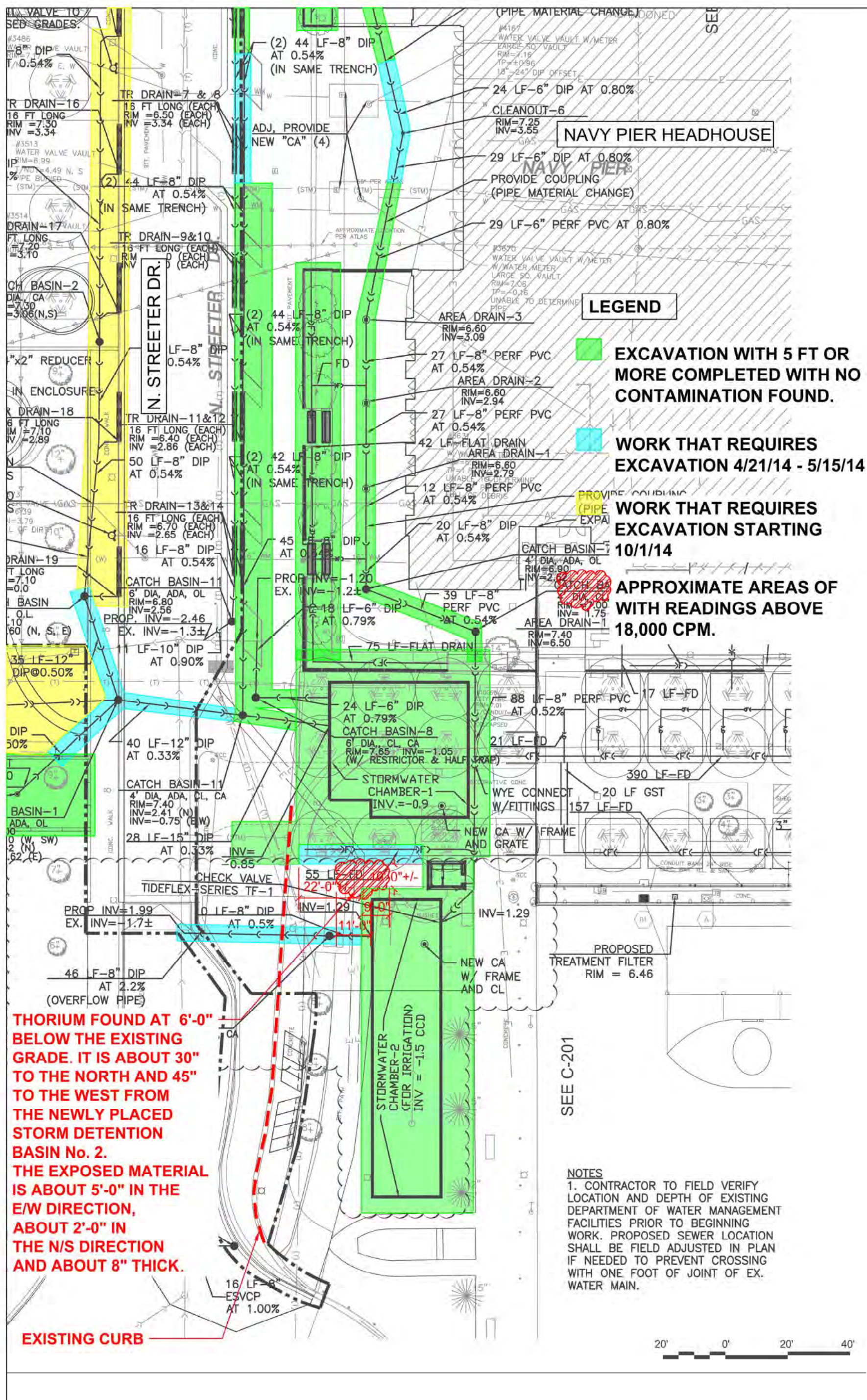
Drawing  
Lab Report

cc:

S. Haemmerle, Navy Pier, Inc.  
M. Mohnalkar, Navy Pier, Inc.  
M. Fulghum, USEPA  
C. Martwick, USEPA  
E. Jablonowski, USEPA



**N. STREETER DR.**





**ASBESTOS ANALYSIS BY POLARIZED LIGHT MICROSCOPY**

Method: EPA-600/M4-82-020

AECOM Environmental Group (Chgo)  
303 East Wacker Suite 909  
Chicago, IL 60601  
Phone: (312) 373-7812  
Fax: (312) 938-1109

Reference: 6031502 Date Received: 04/17/2014  
Location: Navy Pier Date Analyzed: 04/18/2014  
Batch No.: 312831 Date Reported: 04/18/2014  
Customer No.: 2879 Turn Around Time: 24 Hour

Laboratory Sample	Customer Sample Number	Asbestos Components (%)	Non-Asbestos Components (%)
312831001	NP-1	Chrysotile 20-25%	Binder 75-80%

ND = Asbestos Not Detected (Not Present) NA = Not Analyzed NS = Not Submitted

Components of inhomogeneous samples are analyzed per our Standard Operating Procedure, or per customer request.

The use of the NVLAP logo does not imply endorsement by NVLAP or any agency of the US Government.

*The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This report remains property of STAT Analysis until payment is received in full (see invoice).*

Analyzed by Name :

Henry Robitseau / Microscopist

Date: 04/18/2014



# Analysis Corporation

2242 W. Harrison, Suite 200, Chicago, Illinois 60612

Phone: (312) 733-0551 Fax: (312) 733-2386

*e-mail address: STATinfo@STATanalysis.com AIHA accredited 101160 NVLAP lab code 101202-0*

## CHAIN OF CUSTODY RECORD

Page: 1 of 1

Comments: ~~STAR~~ SAMPLE HAS LOW LEVEL THORIUM - QUESTIONS ARE  
STEVE KORNBERG - 262-515-7700

## **Initial Gamma Spectroscopy**

## **Appendix C**

### **Training Attendance Sheet**

## Radiation Safety Training – AECOM Navy Pier May 2014

1. Basic Radiation Physics
  - a. What is ionizing radiation?
  - b. Types of radiation
    - i. Alpha
    - ii. Beta
    - iii. Gamma
    - iv. Neutron
    - v. X-rays
2. ALARA
  - a. Time
  - b. Distance
  - c. Shielding
3. Exposure vs. Contamination
4. Radiation Units and Quantities
  - a. Radioactivity
  - b. Exposure
5. Sources of Radiation
  - a. Man-made
  - b. Background
6. Radiation Biology / Health Effects
  - a. Whole body vs. Localized
  - b. External vs. Internal
  - c. Acute vs. Chronic
  - d. Internal Pathways
7. Personnel Monitoring
  - a. Instrumentation
  - b. Frisking
  - c. Dose Limits
8. Air and Soil Monitoring
  - a. Lift and Bucket Survey Procedure
  - b. Personal Air Monitors
9. Working Safely Around Contaminated Soil



## **Appendix D**

### **Verification Sample Results**

## **Asbestos Analyses**

**ASBESTOS ANALYSIS BY POLARIZED LIGHT MICROSCOPY**

Method: EPA-600/M4-82-020

AECOM Environmental Group (Chgo)  
303 East Wacker Suite 909  
Chicago, IL 60601  
Phone: (312) 373-7812  
Fax: (312) 938-1109

Reference: 60312502  
Location: Navy Pier  
Batch No.: 313303  
Customer No.: 2879

Date Received: 05/12/2014  
Date Analyzed: 05/12/2014  
Date Reported: 05/12/2014  
Turn Around Time: 4 Hour

Laboratory Sample	Customer Sample Number	Asbestos Components (%)	Non-Asbestos Components (%)
313303001	Floor	ND	Other 99-100%
313303002	NW	ND	Other 99-100%
313303003	EW	ND	Other 99-100%
313303004	WW	ND	Other 99-100%

ND = Asbestos Not Detected (Not Present)    NA = Not Analyzed    NS = Not Submitted

Components of inhomogeneous samples are analyzed per our Standard Operating Procedure, or per customer request.

The use of the NVLAP logo does not imply endorsement by NVLAP or any agency of the US Government.

*The information contained in this report and any attachments is confidential information intended only for the use of the individual or entities named above. The results of this report relate only to the samples tested. If you have received this report in error, please notify us immediately by phone. This report shall not be reproduced, except in its entirety, unless written approval has been obtained from the laboratory. This report remains property of STAT Analysis until payment is received in full (see invoice).*

Analyzed by Name:

Henry Robateau / Microscopist



313303

## CHAIN OF CUSTODY RECORD

REGION 5  
77 West Jackson Boulevard  
Chicago, Illinois 60604  
Activity Code:PROJ. NO. 60312502 PROJECT NAME THORUM/NAVY PIER  
SAMPLERS: (Print Name and Sign) Michael CastilloSTA. NO. DATE TIME COMP. GRAB STATION LOCATION  
5/12/14 0338 ✓ FLOOR  
5/12/14 0342 ✓ NW - (North Wall)  
5/12/14 0342 ✓ true  
5/12/14 0344 ✓ EW (East Wall)  
5/12/14 0353 ✓ WW (Duct Wall/West Wall)

NO. OF CONTAINERS

Analyte: Asbestos (PLM)

TAG NUMBERS

SAME DAY TURN

Relinquished by: (Signature) Michael Castillo

Date / Time 5/12/14 0430

Received by: (Signature)

Ship To:

Relinquished by: (Signature)

Date / Time 5/12/14 0530

Received by: (Signature)

Relinquished by: (Signature)

Date / Time 5/12/14

Received for Laboratory by: (Signature)

Date / Time 5/12/14 9:00

Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File

ATTN: STEVE NEWLIN  
Airbill Number STEVE.NEWLIN@AECOM.COM

Chain of Custody Seal Numbers

5/12/14 11:00

## **Gamma Spectroscopy - Verification Sample**

ORTEC g v - i (1215) Env32 G53W4.22 12-MAY-2014 16:07:56  
RSSI Spectrum name: G140106.An1

Sample description  
G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

\*\*\*\*\* S U M M A R Y O F N U C L I D E S I N S A M P L E \*\*\*\*\*  
Time of Count Uncertainty 1 Sigma

Nuclide	Activity uCi/g	Counting	Total
PB-214	4.1503E-07	8.842E+00%	9.112E+00%
PB-212	5.6120E-07	7.054E+00%	7.497E+00%
BI-212	1.1900E-06	1.960E+01%	1.973E+01%
AC-228	8.6826E-07	1.002E+01%	1.025E+01%
Tl-210 <	7.6118E-09		
TL-208	2.1939E-07	9.512E+00%	9.778E+00%
K-40	1.2604E-05	4.319E+00%	5.501E+00%
BI-214	5.1334E-07	7.715E+00%	8.043E+00%
PB-210 <	8.4938E-06		

< - MDA value printed.

A - Activity printed, but activity < MDA.

B - Activity < MDA and failed test.

C - Area < Critical level.

F - Failed fraction or key line test.

H - Halflife limit exceeded

----- S U M M A R Y -----  
Total Activity ( 4.1 to 1779.9 keV) 1.637E-05 uCi/g  
This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 12-MAY-2014 16:07:56  
 RSSI Spectrum name: G140106.An1

Sample description  
 G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

```

***** S U M M A R Y   O F   L I B R A R Y   P E A K   U S A G E   *****
- Nuclide - Average ----- Peak -----
Name   Code   Activity      Energy   Activity Code MDA Value
        uCi/g      keV        uCi/g      uCi/g
-----
PB-214   N    4.1503E-07
          351.93 4.020E-07 ( 2.242E-08 1.08E+01 G
          295.22 4.402E-07 ( 3.923E-08 1.40E+01 G
          77.11 1.644E-06 + 2.514E-07 1.66E+01 XA
          241.99 5.958E-07 + 1.348E-07 2.49E+01 G
          74.82 0.000E+00    1.465E-08 0.00E+00 XA

PB-212   N    5.6120E-07
          238.63 5.612E-07 (P 2.306E-08 6.98E+00 G
          300.09 6.984E-07 + 2.691E-07 4.27E+01 G

BI-212   N    1.1900E-06
          727.33 1.190E-06 ( 1.251E-07 1.96E+01 G
          1620.50 0.000E+00 % 3.826E-07 2.24E+02 G
          785.37 3.933E-06 + 1.123E-06 2.27E+01 G
          893.41 0.000E+00    4.022E-07 0.00E+00 G

AC-228   N    8.6826E-07
          911.20 8.131E-07 ( 4.357E-08 1.25E+01 G
          968.97 1.021E-06 ?( 6.439E-08 1.36E+01 G
          338.32 7.420E-07 *( 6.882E-08 1.53E+01 G
          964.77 8.269E-07 ?( 1.702E-07 3.06E+01 G
          463.00 1.012E-06 ( 1.954E-07 3.15E+01 G

Tl-210   N    0.0000E+00
          298.00 0.000E+00 & 7.612E-09 1.00E+03 G
          799.60 0.000E+00 % 4.136E-09 1.00E+03 G
          1210.00 0.000E+00 % 3.098E-08 1.00E+03 G
          1070.00 0.000E+00 % 1.083E-07 1.00E+03 G
          1316.00 0.000E+00 % 3.953E-08 1.00E+03 G

TL-208   N    2.1939E-07
          583.19 2.151E-07 ( 9.714E-09 9.51E+00 G
          510.77 4.616E-07 + 7.159E-08 1.65E+01 G
          860.58 2.482E-07 ?( 6.076E-08 3.52E+01 G
          277.37 4.275E-07 + 1.487E-07 4.49E+01 G
          763.13 1.238E-06 & 6.639E-07 5.99E+01 G

K-40     N    1.2604E-05
          1460.82 1.260E-05 ( 2.352E-08 4.32E+00 G

BI-214   N    5.1334E-07
          609.32 5.133E-07 @( 1.391E-08 7.72E+00 G
          1764.49 0.000E+00 % 2.028E-08 1.00E+03 G
          1120.29 6.374E-07 + 1.450E-07 1.85E+01 G
          1238.12 1.516E-06 & 4.038E-07 2.74E+01 G
          768.36 6.301E-07 + 2.566E-07 3.92E+01 G

PB-210   N    0.0000E+00
          46.54 0.000E+00 % 8.494E-06 1.00E+03 G
( - This peak used in the nuclide activity average.
  
```

Sample description

G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

- \* - Peak is too wide, but only one peak in library.
- ! - Peak is part of a multiplet and this area went negative during deconvolution.
- ? - Peak is too narrow.
- @ - Peak is too wide at FW25M, but ok at FWHM.
- % - Peak fails sensitivity test.
- \$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
- + - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
- = - Peak outside analysis energy range.
- & - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
- P - Peakbackground subtraction
- } - Peak is too close to another for the activity to be found directly.

Nuclide Codes:

T - Thermal Neutron Activation  
F - Fast Neutron Activation  
I - Fission Product  
N - Naturally Occurring Isotope  
P - Photon Reaction  
C - Charged Particle Reaction  
M - No MDA Calculation  
R - Coincidence Corrected  
H - Halflife limit exceeded

Peak Codes:

G - Gamma Ray  
X - X-Ray  
P - Positron Decay  
S - Single-Escape  
D - Double-Escape  
K - Key Line  
A - Not in Average  
C - Coincidence Peak

-----  
This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 12-MAY-2014 16:07:56  
RSSI Spectrum name: G140106.An1

Sample description  
G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

```
***** U N I D E N T I F I E D   P E A K   S U M M A R Y *****
  Peak Centroid Background Net Area   Intensity   Uncert   FWHM   Suspected
Channel   Energy   Counts     Counts   Cts/Sec    1 Sigma %   keV   Nuclide
-----
  165.71    35.95      100.       95.     0.026    20.92    0.855   -    sM
  342.93    74.68      262.      119.     0.033    25.28    0.721   -    sM
  852.16   185.98      194.       97.     0.027    26.86    0.831   -     s
 1432.79   312.89       30.       16.     0.004    57.58    0.567   -     s
 4138.82   904.38        2.       16.     0.004    29.06    0.645   -     s
```

s - Peak fails shape tests.  
D - Peak area deconvoluted.  
L - Peak written from unknown list.  
C - Area < Critical level.  
M - Peak is close to a library peak.

-----  
This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 12-MAY-2014 16:07:56  
RSSI Spectrum name: G140106.An1

Sample description  
G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

#### Acquisition information

Start time: 12-May-2014 14:55:25  
Live time: 3600  
Real time: 3602  
Dead time: 0.06 %  
Detector ID: 1

#### Detector system

CLTCOMP MCB 9

#### Calibration

Filename: G140106.An1  
05-9-14 calibration GEM-10175

#### Energy Calibration

Created: 12-May-2014 16:07:47  
Zero offset: -0.272 keV  
Gain: 0.219 keV/channel  
Quadratic: 3.328E-09 keV/channel^2

#### Efficiency Calibration

Created: 08-May-2014 19:30:22  
Type: Polynomial  
Uncertainty: 0.804 %  
Coefficients: -0.496291 -5.469037 0.606430  
-0.060110 0.001719 -0.000022

#### Library Files

Main analysis library: 1001a.Lib  
Library Match Width: 0.500  
Peak stripping: Library based

#### Analysis parameters

Analysis engine: Env32 G53W4.22  
Start channel: 20 ( 4.10keV )  
Stop channel: 8144 ( 1779.93keV )  
Peak rejection level: 100.000%  
Peak search sensitivity: 3  
Sample Size: 9.9570E+02  
Activity scaling factor: 1.0000E+00/( 1.0000E+00\* 9.9570E+02 ) =  
1.0043E-03  
Detection limit method: Traditional ORTEC method  
Random error: 1.0000000E+00  
Systematic error: 1.0000000E+00  
Fraction Limit: 0.000%  
Background width: best method (based on spectrum).  
Half lives decay limit: 12.000  
Activity range factor: 2.000  
Min. step backg. energy: 0.000  
Multiplet shift channel: 2.000

#### Corrections

	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	

ORTEC g v - i (1215) Env32 G53W4.22 12-MAY-2014 16:07:56  
RSSI Spectrum name: G140106.An1

Sample description  
G140106 EPA NPV1 Verification (Floor), 995.7g

Spectrum Filename: H:\GammaVision\User\Spectra\G140106.An1

Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	GEM-10175 04_30_14.Pbc 30-Apr-2014 11:30:36
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc.	13	cutoff	20.00000	%
Energy Calibration				
Normalized diff:			0.1419	

Laboratory: RSSI



## **Gamma Spectroscopy - Soil Left In Place**

ORTEC g v - i (1215) Env32 G53W4.22 13-MAY-2014 08:53:33  
RSSI Spectrum name: G140107.An1

Sample description  
G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

\*\*\*\*\* S U M M A R Y O F N U C L I D E S I N S A M P L E \*\*\*\*\*

Nuclide	Activity uCi/g	Uncertainty Counting	1 Sigma Total
PB-214	2.0951E-06	1.025E+01%	1.048E+01%
PB-212	3.8994E-05	8.855E-01%	2.689E+00%
BI-212	4.7050E-05	4.648E+00%	5.166E+00%
AC-228	4.3036E-05	1.874E+00%	2.847E+00%
Tl-210 <	3.6173E-08		
TL-208	1.4170E-05	1.774E+00%	2.876E+00%
K-40 #	1.5406E-05	7.947E+00%	8.646E+00%
BI-214 #	1.9560E-06	1.022E+01%	1.047E+01%
PB-210 <	4.1941E-05		

# - All peaks for activity calculation had bad shape.  
\* - Activity omitted from total  
& - Activity omitted from total and all peaks had bad shape.  
< - MDA value printed.  
A - Activity printed, but activity < MDA.  
B - Activity < MDA and failed test.  
C - Area < Critical level.  
F - Failed fraction or key line test.  
H - Halflife limit exceeded

----- S U M M A R Y -----  
Total Activity ( 270.1 to 1779.9 keV) 1.627E-04 uCi/g

This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 13-MAY-2014 08:53:33  
 RSSI Spectrum name: G140107.An1

Sample description  
 G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

\*\*\*\*\* S U M M A R Y O F L I B R A R Y P E A K U S A G E \*\*\*\*\*

- Nuclide -	Average	-----	Peak	-----			
Name	Code	Activity	Energy	Activity	Code	MDA Value	
		uCi/g	keV	uCi/g		uCi/g	COMMENTS

PB-214	N	2.0951E-06					
			351.93	2.059E-06	(	1.414E-07	1.02E+01 G
			295.22	2.170E-06	(	2.198E-07	1.41E+01 G
			77.11	6.083E-05	+	1.808E-06	2.84E+00 XA
			241.99	2.081E-06	(	8.547E-07	4.15E+01 G
			74.82	0.000E+00		2.865E-08	0.00E+00 XA

PB-212	N	3.8994E-05					
			238.63	3.885E-05	(P	1.362E-07	8.85E-01 G
			300.09	4.083E-05	*(	1.525E-06	5.40E+00 G

BI-212	N	4.7050E-05					
			727.33	4.717E-05	(	1.231E-06	4.65E+00 G
			1620.50	6.120E-05	+	8.069E-06	1.45E+01 G
			785.37	5.521E-05	&	7.340E-06	1.64E+01 G
			893.41	4.495E-05	(	1.211E-05	3.99E+01 G

AC-228	N	4.3036E-05					
			911.20	4.334E-05	(	2.134E-07	1.87E+00 G
			968.97	4.255E-05	(	3.968E-07	2.66E+00 G
			338.32	3.955E-05	-	1.024E-06	2.38E+00 G
			964.77	3.919E-05	-	2.630E-06	7.00E+00 G
			463.00	4.301E-05	(	1.221E-06	4.83E+00 G

Tl-210	N	0.0000E+00					
			298.00	0.000E+00	%	3.617E-08	1.00E+03 G
			799.60	0.000E+00	&	5.698E-08	1.00E+03 G
			1210.00	0.000E+00	%	1.182E-07	1.00E+03 G
			1070.00	0.000E+00	%	3.110E-07	1.00E+03 G
			1316.00	0.000E+00	%	2.394E-07	1.00E+03 G

TL-208	N	1.4170E-05					
			583.19	1.417E-05	(	8.254E-08	1.77E+00 G
			510.77	1.675E-05	+	5.885E-07	3.74E+00 G
			860.58	1.670E-05	+	9.953E-07	6.11E+00 G
			277.37	1.158E-05	-	9.859E-07	1.09E+01 G
			763.13	2.590E-05	+	4.822E-06	2.43E+01 G

K-40	N	1.5406E-05					
			1460.82	1.541E-05	*(	4.390E-07	7.95E+00 G

BI-214	N	1.9560E-06					
			609.32	1.956E-06	*(	1.377E-07	1.02E+01 G
			1764.49	0.000E+00	%	3.965E-08	1.00E+03 G
			1120.29	3.472E-06	+	5.653E-07	2.22E+01 G
			1238.12	3.574E-06	+	1.053E-06	3.31E+01 G
			768.36	0.000E+00		5.241E-08	0.00E+00 G

PB-210	N	0.0000E+00					
			46.54	0.000E+00	%	4.194E-05	1.00E+03 G
			( - This peak used in the nuclide activity average.				

Sample description

G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

- \* - Peak is too wide, but only one peak in library.
- ! - Peak is part of a multiplet and this area went negative during deconvolution.
- ? - Peak is too narrow.
- @ - Peak is too wide at FW25M, but ok at FWHM.
- % - Peak fails sensitivity test.
- \$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
- + - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
- = - Peak outside analysis energy range.
- & - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
- P - Peakbackground subtraction
- } - Peak is too close to another for the activity to be found directly.

Nuclide Codes:

T - Thermal Neutron Activation  
F - Fast Neutron Activation  
I - Fission Product  
N - Naturally Occurring Isotope  
P - Photon Reaction  
C - Charged Particle Reaction  
M - No MDA Calculation  
R - Coincidence Corrected  
H - Halflife limit exceeded

Peak Codes:

G - Gamma Ray  
X - X-Ray  
P - Positron Decay  
S - Single-Escape  
D - Double-Escape  
K - Key Line  
A - Not in Average  
C - Coincidence Peak

-----  
This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 13-MAY-2014 08:53:33  
 RSSI Spectrum name: G140107.An1

Sample description  
 G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

***** U N I D E N T I F I E D				P E A K	S U M M A R Y			*****	
Peak Centroid	Background	Net Area	Intensity	Uncert	FWHM	Suspected			
Channel	Energy	Counts	Counts	Cts/Sec	1 Sigma %	keV	Nuclide		
165.29	35.85	990.	588.	0.163	9.66	0.727	-	M	
258.21	56.16	1175.	124.	0.034	41.61	0.660	-	sM	
343.18	74.73	3490.	2202.	0.612	5.23	0.905	-	sM	
387.07	84.33	2674.	430.	0.119	21.38	0.877	-	s	
399.94	87.14	3528.	1884.	0.523	6.33	1.127	-	s	
412.67	89.92	3360.	1610.	0.447	7.18	1.033	-	s	
428.00	93.27	3165.	1824.	0.507	6.23	0.935	-	s	
455.91	99.38	2189.	535.	0.149	15.34	0.862	-	s	
483.49	105.40	3061.	656.	0.182	15.89	0.884	-	s	
497.18	108.39	2982.	240.	0.067	42.04	0.698	-	s	
528.40	115.22	2617.	391.	0.109	23.85	0.816	-	s	
579.97	126.49	2603.	132.	0.037	65.81	0.439	-	s	
591.69	129.05	3355.	1271.	0.353	8.78	1.002	-	s	
706.32	154.11	2875.	695.	0.193	14.92	1.397	-	s	
958.82	209.29	2611.	2137.	0.594	4.49	0.986	-	s	
1104.19	241.09	1923.	1502.	0.417	4.87	0.917	-	D	
1237.60	270.23	1383.	1543.	0.429	5.63	1.090	-	s	
1434.45	313.25	298.	48.	0.013	52.87	0.320	-	s	
1501.64	327.94	1043.	1167.	0.324	5.95	1.171	-	s	
1874.66	409.47	813.	592.	0.164	10.20	1.171	-		
2394.66	523.13	450.	146.	0.041	31.36	0.293	-	s	
3638.16	794.94	257.	637.	0.177	6.10	1.292	-		
3824.10	835.59	133.	279.	0.077	10.50	1.181	-	s	
3845.85	840.34	158.	187.	0.052	16.98	0.715	-	s	
7287.26	1592.63	96.	347.	0.096	8.91	1.401	-	s	

s - Peak fails shape tests.  
 D - Peak area deconvoluted.  
 L - Peak written from unknown list.  
 C - Area < Critical level.  
 M - Peak is close to a library peak.

-----  
 This section based on library: 1001a.Lib

ORTEC g v - i (1215) Env32 G53W4.22 13-MAY-2014 08:53:33  
RSSI Spectrum name: G140107.An1

Sample description  
G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

#### Acquisition information

Start time: 12-May-2014 16:14:13  
Live time: 3600  
Real time: 3621  
Dead time: 0.59 %  
Detector ID: 1

#### Detector system

CLTCOMP MCB 9

#### Calibration

Filename: G140107.An1  
05-9-14 calibration GEM-10175

#### Energy Calibration

Created: 12-May-2014 16:07:47  
Zero offset: -0.272 keV  
Gain: 0.219 keV/channel  
Quadratic: 3.328E-09 keV/channel^2

#### Efficiency Calibration

Created: 08-May-2014 19:30:22  
Type: Polynomial  
Uncertainty: 0.804 %  
Coefficients: -0.496291 -5.469037 0.606430  
-0.060110 0.001719 -0.000022

#### Library Files

Main analysis library: 1001a.Lib  
Library Match Width: 0.500  
Peak stripping: Library based

#### Analysis parameters

Analysis engine: Env32 G53W4.22  
Start channel: 20 ( 4.10keV )  
Stop channel: 8144 ( 1779.93keV )  
Peak rejection level: 100.000%  
Peak search sensitivity: 3  
Sample Size: 5.0940E+02  
Activity scaling factor: 1.0000E+00/( 1.0000E+00\* 5.0940E+02 ) =  
1.9631E-03  
Detection limit method: Traditional ORTEC method  
Random error: 1.0000000E+00  
Systematic error: 1.0000000E+00  
Fraction Limit: 0.000%  
Background width: best method (based on spectrum).  
Half lives decay limit: 12.000  
Activity range factor: 2.000  
Min. step backg. energy: 0.000  
Multiplet shift channel: 2.000

#### Corrections

	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	

ORTEC g v - i (1215) Env32 G53W4.22 13-MAY-2014 08:53:33  
RSSI Spectrum name: G140107.An1

Sample description  
G140107 EPA NPV2 Duct Bank (West Wall), 509.4g

Spectrum Filename: H:\GammaVision\User\Spectra\G140107.An1

True coincidence correction:	NO	
Peaked background correction:	YES	GEM-10175 04_30_14.Pbc
		30-Apr-2014 11:30:36
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks alloc.	26	cutoff	20.00000	%
Energy Calibration				
Normalized diff:			0.0376	

Laboratory: RSSI

## Activity Code:

Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File



## **Appendix E**

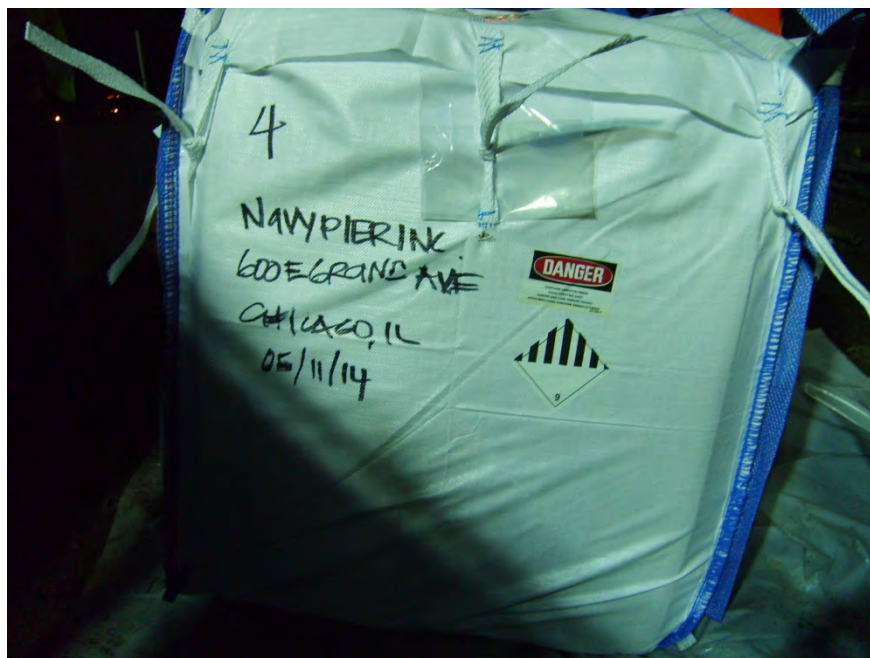
### **Remediation Excavation Photographs**



1. Reddish orange radiological contaminated material at the base of the remedial excavation.



2. The western wall of the remedial excavation where radiological contaminated material was left in place beneath the ComEd Duct Bank.



3. Super Sack used to store the radiologically contaminated material.



4. View of the remedial excavation nearing completion.

## **Appendix F**

### **USEPA Signed Notification of Successful Verification Sampling Forms**

FORM 223-1  
NOTIFICATION OF SUCCESSFUL VERIFICATION SURVEYArea Identification: NPVP1 Verification FloorDate of Verification Survey: Monday May 12, 2014Time of Verification Survey: 3:38AM

The above-described excavation was surveyed at the time and date indicated above. The survey indicated that all soils have been removed as required by the Site Removal Action Criteria.

Documents pertaining to this survey are attached for review and approval by the USEPA.

Signed: Steve KornderDate: Monday May 12, 2014Print Name: Steve KornderPrint Title: Senior Project Geochemist

AECOM

The attached Verification Survey documents were reviewed by USEPA, Region 5 on 5/13/14. The results of this survey indicate that the verification criteria as contained in the ~~Administrative Settlement Agreement and Order on Consent~~.

City of Chicago Tronox/Streetsville Removal Response Cooperative Agreement and QAPP. VS  
Authorization is hereby granted to commence backfill and restoration work at this excavation.

Date: 5/13/14Print Name: Veeneta SimonPrint Title: on-scene Coordinator

For USEPA Region 5

## **Appendix G**

### **Disposal Information**



AECOM  
303 E. Wacker Drive, Suite 900  
Chicago, Illinois 60601

312-373-7700  
312-938-1109

tel  
fax

September 22, 2014

**VIA Overnight Mail**

Ms. Kim Custer  
Hazardous Waste Permit Officer  
Idaho Department of Environmental Quality  
1410 North Hilton  
Boise, Idaho 83706

**Re: Notification of Initial Shipment of Radiologically Contaminated Soil, Lindsay Light II Site, 600 East Grand Ave, Chicago, IL ("Site"); Cooperative Agreement V-00E01070-0;**

Dear Ms. Custer:

Please be advised that Navy Pier, Inc. is providing this written notification of Initial Shipment of Radiologically Contaminated Soil from the above Site, pursuant to a request from the United States Environmental Protection Agency (Region V) who oversees the Lindsay Light II Site remediation efforts in Chicago's Streeterville area.

The name of the facility to which the radiologically contaminated soil will be shipped is U.S. Ecology disposal facility in Grand View, Idaho. The shipment of approximately seven (7) cubic yards of pre-1978 11e(2) byproduct material will be made in one (1) cubic yard bags within a lined steel covered roll-off type box. Shipment is being arranged by SET Environment, Inc. of Wheeling Illinois. The initial shipment will involve transporting fill soil in late September 2014, which is expected to arrive at U. S. Ecology the week of September 29, 2014. Although no additional shipments are planned at this time, further shipments could be required if contaminated soil is discovered during future excavation work.

Should you have any questions, please contact us at 262-515-7700.

Regards,

Steve T. Newlin  
Senior Project Geologist

Steve C. Kornder, Ph. D.  
Senior Geochemist

cc: Verneta Simon, On-Scene Coordinator, USEPA  
Gene Jablonowski, Project Manager, USEPA  
Mary Fulghum, Region 5, Associate Regional Counsel, USEPA  
Steve Haemmerle, Navy Pier, Inc.  
Mahesh Mohnalkar, Navy Pier, Inc.



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US Ecology Idaho, Inc.  
P.O Box 400  
20400 Lemley Road  
Grand View, Idaho 83624

Phone: (800) 274 1516  
(208) 834 2275  
Fax: (208) 834 2997  
(208) 834 2919

---

# US Ecology Idaho

a *US Ecology Inc.* company

---

July 02, 2014

Mark Delfratte  
ICE SERVICE GROUP  
192 OHIO RIVER BLVD, SUITE 100  
AMBRIDGE, PA 15003

RE: Generator : **NAVY PIER, INC**  
US Ecology WS # : **26883-0**  
Waste Stream Name : **(1 TIME) NON REGULATED SOIL**  
Expiration Date : **07/01/2015**

Dear Mark Delfratte,

The above listed waste stream has been approved for acceptance at US Ecology Idaho (USEI), which is an authorized facility and has the appropriate permits necessary to handle the waste material described on the "Waste Product Questionnaire" (WPQ) as presently approved.

This Waste Profile is identified with a Waste Stream ID Number and is valid until the expiration date of **07/01/2015** when annual re-characterization of the waste is required.

Shipment of the waste profiled by the above WSID constitutes the acceptance of all Terms and Conditions listed as an Addendum to the Agreement/Contract. If the regulations change, or the waste stream itself changes, it is the generator's responsibility to inform USEI by a letter or submittal of a new profile and current analysis.

All waste material must be packaged, labeled and manifested in strict accordance with all applicable EPA and DOT requirements. The above WSID must be marked on each drum or unit.

To schedule a delivery, please call **Sophie Livingston in the Customer Service Department at 1-800-274-1516 ext. 310, at least 48 hours prior to your anticipated shipping date. Scheduling hours are from 7:30 a.m. to 3:30 p.m. MST, Monday through Friday.**

If you have any questions or need additional information, please feel free to call the Customer Service Department at 1-800-274-1516.

Sincerely,



TINO CERECERES  
CUSTOMER SERVICE SUPERVISOR





ADDITIONAL GENERATOR LOCATION REQUEST

Facility Use Only

Date Added

Initial

Please use a separate form for each new generator location

This notice is to request the addition of another location to your waste profile referenced below.

Profile Number (original profile): WS#26883-0

Generator Site Name: Navy Pier, Inc.

Generator Site Address: 600 East Grand Ave, Chicago, IL 60611

Generator Mailing Address: 600 East Grand Ave, Suite 134, Chicago, IL 60611

Generator EPA ID#: N/A ☐ LQG ☐ SQG ☐ CESQG

(If this is a CESQG generator, please return the CESQG Certification Statement with this application)

SIC Codes:

Common Name of Waste: Radioactive Contaminated Fill Soils with Asbestos

Process Generating the Waste: See attached

Knowledge is from : ☒ Lab Analysis ☐ MSDS ☒ Process/Generator Knowledge  
(Please submit lab analysis, MSDS, photos of label and/or other records for documentation file)

EPA Hazardous Waste Codes: N/A Appearance: soil/mantles

Composition:

(Range Total > or = 100%) Values are: <input type="checkbox"/> TCLP <input type="checkbox"/> TOTALS			
(Include additional sheets if necessary)			
Typical Value		Unit	Range
Soil		%	50-75
Cinders/Ash		%	25-50
Mantle String Ties		%	0-1

I certify under penalty of law that I am familiar with this waste stream through analysis and/or process knowledge, and that all information is true and accurate, representative and complete and that all known or suspected hazards have been disclosed. Further I am authorized to submit this request and the information provided on behalf of my company or the waste generator.

Requestor Name (print): Steven J. Haemmerle Signature:

Phone#: 312.595.5385 Date: 06.24.14

US Ecology Idaho  
(800) 274-1516  
[useics@usecology.com](mailto:useics@usecology.com)

US Ecology Michigan  
(800) 396-3265  
[usemcs@usecology.com](mailto:usemcs@usecology.com)

US Ecology Nevada  
(800) 239-3943  
[usenecs@usecology.com](mailto:usenecs@usecology.com)

US Ecology Texas  
(800) 242-3209  
[usetcs@usecology.com](mailto:usetcs@usecology.com)

**Process Generating the Waste**

Urban fill soil that was contaminated by materials/wastes (including tailings) derived from operations at the former Lindsay Light Company, which extracted monazite for thorium used to coat silk mantles for gas lamps prior to the mid 1930's. This fill soil appears to contain some asbestos containing string ties that were used on the mantles.

Box # HT 2649  
7yrd

14100207096

<b>UNIFORM HAZARDOUS WASTE MANIFEST</b>		1. Generator ID Number <b>CESQG</b>	2. Page 1 of <b>1</b>	3. Emergency Response Phone <b>877-437-7455</b>	4. Manifest Tracking Number <b>012968185 JJK</b>		
5. Generator's Name and Mailing Address <b>Navy Pier, Inc. 600 E. Grand Ave Suite 134 Chicago, IL 60611</b>			Generator's Site Address (if different than mailing address) <b>600 E. Grand Ave Suite 134 Chicago, IL 60611</b>				
Generator's Phone: <b>312-595-5385</b>							
6. Transporter 1 Company Name <b>SET Environmental, Inc.</b>				U.S. EPA ID Number <b>ILD981957236</b>			
7. Transporter 2 Company Name				U.S. EPA ID Number			
8. Designated Facility Name and Site Address <b>US ECOLOGY IDAHO 20400 Lemley Road Grand View, ID 83624</b>				U.S. EPA ID Number <b>IDD073114654</b>			
Facility's Phone:							
GENERATOR	9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers		11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
			No.	Type			
	RQ	1. NA2212 Asbestos 9 PGIII	1	CR + BLS	7	Y	
		2.					
		3.					
		4.					
14. Special Handling Instructions and Additional Information  <b>1=26883-0: Contaminated Fill Soils</b>							
15. <b>GENERATOR'S/OFFEROR'S CERTIFICATION:</b> I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.							
Generator's/Officer's Printed/Typed Name <b>STEVEN J HAEMMERLE</b> Signature <i>Steven J Haemmerle</i> Month Day Year <b>9 26 14</b>							
INT'L	16. International Shipments <input type="checkbox"/> Import to U.S. <input type="checkbox"/> Export from U.S. Port of entry/exit: Date leaving U.S.:						
TRANSPORTER	17. Transporter Acknowledgment of Receipt of Materials						
	Transporter 1 Printed/Typed Name <b>Danny H Goulet</b> Signature <i>Danny H Goulet</i> Month Day Year <b>9 26 14</b>		Transporter 2 Printed/Typed Name <i>[Signature]</i> Signature <i>[Signature]</i> Month Day Year <b>9 26 14</b>				
DESIGNATED FACILITY	18. Discrepancy						
	18a. Discrepancy Indication Space <input type="checkbox"/> Quantity <input type="checkbox"/> Type <input type="checkbox"/> Residue <input type="checkbox"/> Partial Rejection <input type="checkbox"/> Full Rejection						
	Manifest Reference Number:						
	18b. Alternate Facility (or Generator) U.S. EPA ID Number						
	Facility's Phone:						
	18c. Signature of Alternate Facility (or Generator) Month Day Year						
	19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)						
	1. <b>H132</b>	2.	3.	4.			
	20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a						
	Printed/Typed Name <b>Corian Kastner</b> Signature <i>Corian Kastner</i> Month Day Year <b>10/2/14</b>						

## Scale Ticket

Phone: 800 274 1516

**U.S. ECOLOGY IDAHO, INC.**

GRAND VIEW, ID

**Scale Ticket #:**

**Work Order #:** 14100207096

**Checkin Date:** 10/02/2014 **Time:** 07:24

**Checkout Date:** 10/02/2014 **Time:** 08:41

012968185 JJK

**Transporter:**

SET ENVIRONMENTAL  
450 SUMAC ROAD  
WHEELING, IL

**EPA ID:** ILD981957236

**Customer**

ICE SERVICE GROUP  
192 OHIO RIVER BLVD, SUITE 100  
AMBRIDGE, PA

**Truck #:** 4-DAVID

**Tractor #:**

**Trailer #:**

**Driver:** DAVID BENDIX

**GROSS WEIGHT :** 60,440.00 **LBs**

**TARE WEIGHT :** 44,720.00 **LBs**

**NET WEIGHT :** 15,720.00 **LBs**

## **Appendix H**

### **Equipment Release Survey**



## **Appendix I**

### **Asbestos Air Monitoring**



May 19, 2014

Mr. Mike Lanenga  
SET Environmental, Inc.  
450 Sumac Road  
Wheeling, IL 60090

**Re: Asbestos Air Sampling Results at Navy Pier, Chicago, IL  
Air Monitoring for Soil Removal  
Carnow Conibear Project A144610089**

Dear Mr. Lanenga:

Attached please find the results of the air sampling Carnow, Conibear & Assoc., Ltd. (Carnow Conibear) conducted at the above referenced location. The air sampling was performed to measure the concentration of total airborne fibers associated with the removal of asbestos contaminated soil. Sampling and analysis was conducted by Carnow Conibear representative Mr. Brian Barry on May 11, 2014. Mr. Barry is licensed by the Illinois Department of Public Health as an Air Sampling Professional, IDPH license number 100-11167.

NIOSH Test Method 7400 "Total Airborne Fibers" was used to collect and analyze air samples during abatement activities conducted by SET Environmental, Inc. NIOSH Test Method 7400 utilizes the collection of airborne particulate matter on mixed cellulose ester membrane filters and analysis of the fibrous portion by phase contrast microscopy at 400X magnification. The method factors in all particles meeting the physical definition of a fiber, greater than 5 microns in length and a length to width ratio greater than 3:1, and is not specific for asbestos fibers. All samples were below clearance criteria set by the Illinois Department of Public Health (IDPH).

The results of the sample analysis are summarized on the attached table. See Attachment A for Mr. Barry's current license and accreditation and Attachment B for the sample chain of custody documentation and daily field log of observations.

Please feel free to call me directly at 312.762.2928 if you have any questions or require any additional information.

Sincerely,

**CARNOW CONIBEAR & ASSOC., LTD.**

A handwritten signature in blue ink, appearing to read "David J. Kedrowski".

David J. Kedrowski, CIH  
Executive Vice President



**CARNOW, CONIBEAR & ASSOC., LTD**  
600 W. Van Buren St., Ste. 500  
CHICAGO, IL 60607

**PHASE CONTRAST MICROSCOPY (PCM) LABORATORY ANALYSIS REPORT**  
**OSHA COMPLIANCE MONITORING**

PROJECT #:

A144610089

JOB SITE:

South Side of Navy Pier

CLIENT:

SET Environmental Inc.

COLLECTED BY:

Brian Barry - Air Sampling Professional (IDPH License #100-11167)

DATE:

May 11, 2014

Sample #	Rate (L/Min)	Start Time	Stop Time	Total Min.	Volume	Fibers Counted	Fields	F/cc	Sample Description/Location
BB 5-11-14-01	4.0	9:30 am	2:30 pm	300	1200	15	100	0.006	Area - Southeast section of work area
BB 5-11-14-02	4.0	9:35 am	2:35 pm	300	1200	18	100	0.007	Area - North section of work area
BB 5-11-14-03	4.0	9:38 am	2:40 pm	302	1208	20	100	0.008	Area - East section of work area
BB 5-11-14-04	4.0	9:50 am	2:45 pm	295	1180	21	100	0.009	Personal - Roy Hicks, Soil removal
BB 5-11-14-05	-	-	-	-	-	1	100	-	Field Blank
BB 5-11-14-06	-	-	-	-	-	1	100	-	Field Blank

Comments:

Sampling conducted during the removal of possibly contaminated soil from the south side of Navy Pier in Chicago, IL.

Collected By: Brian Barry - Air Sampling Professional (NIOSH Test Method 7400), License #100-11167  
Analyzed By: Brian Barry - Air Sampling Professional (NIOSH Test Method 7400).

\*OSHA Permissible Exposure Limit is 0.1 f/cc (8 hour Time Weighted Average)

# ATTACHMENT A

# Brian Barry

Illinois Licensed Asbestos Inspector, Project Manager, and  
Air Sampling Professional



## ASBESTOS PROFESSIONAL LICENSE

ID NUMBER  
**100 - 11167**

ISSUED  
**5/13/2013**

EXPIRES  
**05/15/2014**

**BRIAN J BARRY**  
**6020 GREEN DRIVE**  
**WOODRIDGE, IL 60517**  
Environmental Health



### ENDORSEMENTS

### TC EXPIRES

INSPECTOR

2/6/2014

PROJECT MANAGER  
AIR SAMPLING PROFESSIONAL

2/7/2014

**Alteration of this license shall result in legal action**  
This license issued under authority of the State of Illinois  
Department of Public Health  
This license is valid only when accompanied by a valid  
training course certificate.

# MCCRONE RESEARCH INSTITUTE



*MA*

*Bridget J. Barry*

Course Date: February 26-March 2, 2007  
3.5 CEU's

# ATTACHMENT B

## DAILY LOG

**CARNOW  
CONIBEAR**

Page 1 of 2

Date: 5-11-14 Employee: Brian Barry  
Project Name: Navy Pier Project Number: A1446/0089  
Site Location: South side/Navy Pier Scope of Work: ASP/soil  
Location of Work: South side of Navy Pier  
Daily Activities: Air monitoring for Soil Removal  
Contractor: SET Name of Supervisor(s): Roy Claudio Number of Workers: 3  
Work Shift: \_\_\_\_\_ Number of Samples: TEM \_\_\_\_\_ PCM \_\_\_\_\_

### Comments/Discussion:

7<sup>30</sup> SET on CCA on-site met with supervisor from SET, General contractor  
setty forward and EPA to go over scope of work. tonight SET will  
be removing possible contaminated soil from work area. Soil will be placed  
into large lined burlap waste containers. Plastic burlap containers are lined  
with 6mil liner. dumpsters are lined with 6mil poly. CCA on-site  
to run PCM air monitoring. waste containers have Acas warning label  
and all DOT stickers. Soil is removed via back-hoe all soil  
material thoroughly wetted by rain. No visible problems general Contractor  
marks with spray paint areas to be removed. All visible granular  
contaminated soil removed and loaded out. EPA does bulk sampling  
of soil. Work finished all waste loaded out CCA Collects  
Air sampling equipment and leaves site

Copies:

Employee Signature: Brian Barry

IDPH License No.: 100-11167



PCM ANALYSIS FORM

Page 2 of 2

Project #: A144610089

Job Site: Navy Pier

Client: SET

Employee: Brian Barry

Date: 5-11-14

Job Description: Asp/ Soil removal

Sampling Area Location: South side of Navy Pier

Type of Sampling (Area, BG, PS, FA, etc.): Personal, Area

Analysis (Onsite, TAT):

Sample Number	LPM	Start Time	Stop Time	Total Min.	Vol.	Fibers/Field	f/cc	Sample Location Comments
BB 5-11-14-01	4.0	9:30	2:35	3:00	1200	15/100	0.006	Area South East section of work Area
BB 5-11-14-02	4.0	9:35	2:35	3:00	1000	18/100	0.007	Area North section of work area
BB 5-11-14-03	4.0	9:38	2:40	3:02	1208	20/100	0.008	Area East section of work area
BB 5-11-14-04	4.0	9:50	2:45	2:55	1180	21/100	0.009	Personal Key ticks - soil removal
BB 5-11-14 05						1/100		field blank
BB 5-11-14 06						1/100		field blank

Comments:

QA/QC Recount Sample #: BB 5-11-14-04 Fibers: 16 Fields: 100 Analyzed By: BB

Collected By: B. Barry Date: 5-12-14 Relinquished By: B. Barry Date: 5-12-14

Received By: \_\_\_\_\_ Date: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_

Analyzed By: B. Barry Date: 5-12-14 AAR #: \_\_\_\_\_

## **Appendix J**

### **Personal Air Monitoring Results**



# Personal Air Monitoring Summary Sheet (PAM's -Daily Analysis)

Report No. 1 May 16, 2014

Navy Pier, Chicago, IL AECOM

						day after analysis							four day analysis						
Date Collected	Init	Sample ID	Flow Rate (lpm)	Total Time Sampled	Total Sample Volume (ml)	Analysis Date	Gross Counts (30 min)	Gross CPM	Bkg CPM	Net CPM	eff	Sample Concentration (uCi/ml)	Analysis Date	Gross Counts (30 min)	Gross CPM	Bkg CPM	Net CPM	eff	Sample Concentration (uCi/ml)
5/11/14	GH	NP001	2.5	320	8.00E+05	No day after count performed - 4 day analysis only GAH							05/16/14	11	0.37	0.43	0.00	0.380	0.00E+00

\*\*\*Note: Samples with counts greater than background on day after analysis are analyzed again after 4 days to allow for radon / thoron progeny decay

Occupational Dose Limit for Occupational Radiation Exposure = 5 rem Total Effective Dose Equivalent

2000 DAC-Hours = 5 rem

DAC (Derived Air Concentration) for Th-232 = 5E-13uCi/ml

Administrative Site Limit for Occupational Exposure = 30% Th-232 DAC = 1.5E-13 uCi/ml

# FORM SOP-212-11

## RADIOLOGICAL AIR SAMPLE DATA FORM – PAM'S

Equation:

$$\text{Volume (V)} = (\text{Pump liters/min.}) (\text{Total Sample Time in minutes}) (1000 \text{ ml/liter})$$

### Sample Collection

Person Wearing Monitor	Pump #	Sample #	Date	Sample Start Time	Sample End Time	Total Sample Time	Cubic liters/min. LPM	Total Sample Volume (ml)
Glenn Huber	002-766	NP001	5/11/14	9:50p	2:50a	320min	2.5	$8.0 \times 10^4$

Equation: Actual Activity = Activity (A) - Background (B)

$$\text{Activity (A)} = \frac{(\text{Net CPM}) (1/\text{Eff.})}{(V) (2.2 \text{ E} + 6 \text{ dpm/uCi}) (\text{filter retention factor}) (5)}$$

### Sample Analysis

Sample #	Cal. By	Date	Gross Counts	Net CPM	Detector Efficiency (EFF)	Sample Volume Analyzed (ml)	Sample Concentration (A) $\mu\text{Ci/ml}$	Background Activity (B) $\mu\text{Ci/ml}$	Actual Concentration $\mu\text{Ci/ml}$
NP001	GAH	5/16/14	11	0	0.380	$8 \times 10^5$	0		

Filter retention factor/absorption correction = 0.7 for Staplex 8x10 ashless paper filter  
= 1.0 for 37mm PAM membrane filters

Note: Activity is divided 5 due to the Thorium daughters that are counted with an open window (gross alpha)

30 minute background count for 5/16/14 is 13 cpm  
date

30 minute background count for NA is \_\_\_\_\_ cpm  
date

\*2 day only  
GAH

## **Appendix K**

### **Equipment Calibration Records**

AECOM

# Ludlum Model 2221/44-10 Calibration

page 1 of 2

Model 2221 serial number: 176944Probe 44-10 serial number: N/ADate: 10/18/13

## Scaler Linear Check

Pulser model/serial number: Ludlum-500 1 142038Calibration Due Date: 12/3/13Threshold set to 100 mv. 6AH (tech. init.)

As Found

Pulser setting in cts.	Multiplier	Scaler reading in cts.	After Adjustment Scaler reading in cts.
<u>400</u>	<u>X1</u>	<u>400</u>	<u>-</u>
<u>4k</u>	<u>X10</u>	<u>3995</u>	<u>-</u>
<u>40k</u>	<u>X100</u>	<u>39911</u>	<u>-</u>
<u>400k</u>	<u>X1000</u>	<u>399104</u>	<u>-</u>

## Voltage Plateau

Source isotope/serial number: CS-137 0.894Ci  
#4830 1 on 12/20/51

### BKGD PLATEAU

volts	30 sec BKG counts	Source counts
<u>700</u>	<u>804</u>	<u>15371</u>
<u>750</u>	<u>1256</u>	<u>20265</u>
<u>800</u>	<u>2026</u>	<u>23735</u>
<u>850</u>	<u>2671</u>	<u>26141</u>
<u>900</u>	<u>3087</u>	<u>27121</u>
<u>950</u>	<u>3416</u>	<u>28035</u>
<u>1000</u>	<u>3512</u>	<u>28555</u>
<u>1050</u>	<u>3508</u>	<u>29191</u>

### SOURCE PLATEAU

volts	30 sec BKG counts	Source counts
<u>1100</u>	<u>3644</u>	<u>28950</u>
<u>1150</u>	<u>3585</u>	<u>28976</u>
<u>1200</u>	<u>3716</u>	<u>29030</u>

operating voltage selected: 1050 V

AECom

# Ludlum Model 2221/44-10 Calibration

page 2 of 2

Model 2221 serial number: 176944

unshielded

Probe 44-10 serial number: N/A

Date: 10/18/13



window verified at about 3830

## Instrument BKGD

### 1 minute BKDG counts

<u>5470</u>	<u>5245</u>
<u>5506</u>	<u>5609</u>
<u>5553</u>	<u>5423</u>
Average: <u>5468</u>	

## Source Block Data

Source block ID: 2012 - 5417A  
2012 - 5427A  
2012 - 5437A  
2012 - 5447A

### 1 minute Source Block counts

<u>24467</u>	<u>24172</u>
<u>24558</u>	<u>24597</u>
<u>25176</u>	<u>24252</u>

Average: 24537 cpm Net Average: 19069 cpm

## Activity Calculation

Net Average source count rate of: 19069 cpm

divided by 10 = 1906.9

<sup>7.1</sup>  
Times ~~7.2~~ = 13538.99 (A)

Square root of (A) = 116.36 times 2 = 232.72 (B)

(A) plus the average BKGD = 19006.99 <sup>7.1</sup> CPM/7.2 pCi

The cutoff value is: 18,774 <sup>7.1</sup> (CPM/7.2 pCi minus (B))

unshielded

Calibration performed by: GLH

DATE: 10/18/13

Calibration approved by: \_\_\_\_\_

DATE: \_\_\_\_\_

AECOM

# Ludlum Model 2221/44-10 Calibration

page 2 of 2

Model 2221 serial number: 176944Probe 44-10 serial number: N/Aw/ 6" shieldDate: 10/18/13

window verified at about 3830

## Instrument BKGD

### 1 minute BKDG counts

177918261760181719621808Average: 1825

## Source Block Data

Source block ID:

2012 - 5417A  
2012 - 5427A  
2012 - 5437A  
2012 - 5447A

### 1 minute Source Block counts

887188818843887889208836Average: 8872 cpm Net Average: 704.7 cpm

## Activity Calculation

Net Average source count rate of: 704.7 cpmdivided by 10 = 70.47Times  $\frac{7.1}{7.2}$  = 5003.37 (A)Square root of (A) = 70.73 times 2 = 141.46 (B)(A) plus the average BKGD = 6828.37 CPM/ $\frac{7.1}{7.2}$  pCiThe cutoff value is: 6687 (CPM/ $\frac{7.1}{7.2}$  pCi minus (B))w/ 6" shieldCalibration performed by: GLHDATE: 10/18/13

Calibration approved by: \_\_\_\_\_

DATE: \_\_\_\_\_

# Ludlum Model 2221/44-10 Calibration

page 1 of 2

Model 2221 serial number: 134542Probe 44-10 serial number: 168143Date: 10/18/13

## Scaler Linear Check

Pulser model/serial number: Ludlum 500 1 142038Calibration Due Date: 12/3/13Threshold set to 100 mv. GAH (tech. init.)

Pulser setting in cts.	Multiplier	As Found Scaler reading in cts.	After Adjustment Scaler reading in cts.
<u>400</u>	<u>X1</u>	<u>400</u>	<u>-</u>
<u>4k</u>	<u>X10</u>	<u>3993</u>	<u>-</u>
<u>40k</u>	<u>X100</u>	<u>39945</u>	<u>-</u>
<u>400k</u>	<u>X1000</u>	<u>399491</u>	<u>-</u>

## Voltage Plateau

Source isotope/serial number: Cs-137 1 0.89uCi  
#4830 on 12/20/95

### BKGD PLATEAU

60sec

volts	Source counts	Bkg counts
<u>700</u>	<u>48596</u>	<u>3910</u>
<u>750</u>	<u>55151</u>	<u>5251</u>
<u>800</u>	<u>58333</u>	<u>6316</u>
<u>850</u>	<u>59380</u>	<u>6615</u>
<u>900</u>	<u>60162</u>	<u>6988</u>
<u>950</u>	<u>60652</u>	<u>7025</u>
<u>1000</u>	<u>61357</u>	<u>7007</u>
<u>1050</u>	<u>61444</u>	<u>7100</u>

### SOURCE PLATEAU

60sec

volts	Source counts	Bkg counts
<u>1100</u>	<u>62607</u>	<u>7789</u>
<u>1150</u>	<u>66158</u>	<u>8525</u>
<u>1200</u>	<u>71359</u>	<u>9866</u>

operating voltage selected: 1000 V

# Ludlum Model 2221/44-10 Calibration

unshielded

page 2 of 2

Model 2221 serial number: 134542

Probe 44-10 serial number: 168143

Date: 10/18/13



window verified at about 3830

## Instrument BKGD

### 1 minute BKDG counts

<u>4149</u>	<u>4092</u>
<u>4056</u>	<u>4051</u>
<u>4114</u>	<u>4144</u>
Average: <u>4101</u>	

## Source Block Data

Source block ID: 2012 - 5417A  
2012 - 5427A  
2012 - 5437A  
2012 - 5447A

### 1 minute Source Block counts

<u>23428</u>	<u>23165</u>
<u>23699</u>	<u>23335</u>
<u>23376</u>	<u>23439</u>

Average: 23407 cpm      Net Average: 19306 cpm

## Activity Calculation

Net Average source count rate of: 19306 cpm

divided by 10 = 1930.6

Times <sup>7.1</sup>~~7.2~~ = 13707.26 (A)

Square root of (A) = 117.08 times 2 = 234.16 (B)

(A) plus the average BKGD = 17808.26 CPM/<sup>7.1</sup>~~7.2~~ pCi

The cutoff value is: 17574 (CPM/<sup>7.1</sup>~~7.2~~ pCi minus (B))

unshielded

Calibration performed by: GPK

DATE: 10/18/13

Calibration approved by: \_\_\_\_\_

DATE: \_\_\_\_\_



# Ludlum Model 2221/44-10 Calibration

page 2 of 2

Model 2221 serial number: 134542

w/ 6" shield

Probe 44-10 serial number: 168143

Date: 10/18/13

☐ window verified at about 3830

## Instrument BKGD

### 1 minute BKGD counts

<u>1179</u>	<u>1099</u>
<u>1158</u>	<u>1130</u>
<u>1105</u>	<u>1143</u>
Average: <u>1136</u>	

## Source Block Data

Source block ID:

2012 - 5417A  
2012 - 5427A  
2012 - 5437A  
2012 - 5447A

### 1 minute Source Block counts

<u>8484</u>	<u>8298</u>
<u>8419</u>	<u>8356</u>
<u>8396</u>	<u>8338</u>
Average: <u>8382</u>	cpm
Net Average: <u>7246</u>	cpm

## Activity Calculation

Net Average source count rate of: 7246 cpm

divided by 10 = 724.6

<sup>7.1</sup>  
Times 7.2 = 5144.66 (A)

Square root of (A) = 71.73 times 2 = 143.46 (B)

(A) plus the average BKGD = 6280.66 CPM/<sup>7.1</sup>7.2 pCi

The cutoff value is: 6137 (CPM/<sup>7.1</sup>7.2 pCi minus (B))

6" shielded

Calibration performed by: GLH

DATE: 10/18/13

Calibration approved by: \_\_\_\_\_

DATE: \_\_\_\_\_

*Stan A. Huber Consultants, Inc.*

**Ludlum Model 2221 w/ 43-10 NaI**

**134542**

**Cs-137 Disc 0.89 uCi serial no 4830**  
(box closed)

to

52336 cpm

to

63967 cpm

[illegible]

AECOM - Navy Pier May 2014

[illegible]

## Daily Radiation Survey Instrument Function Check

*Stan A. Huber Consultants, Inc.*

**Instrument Model:**

**Ludlum 14C w/ 44-9 G-M Detector**

Instrument Serial Number:

114750

Check Source ID:

### Side Thorium Check Mantle

Acceptable BKG Count Rate (+/- 10%)

 $\angle 100 \angle p -$ 

to

Acceptable Source Count Rate (+/- 10%)

8100 cpm

to

9900 cpm

[illegible]

*Stan A. Huber Consultants, Inc.*

## Bicron MicroRem

**C258C**

**Cs-137 10 uCi Jig 5/90**

 $\leq 10 \mu R_{F-}/R$  to

180  $\mu$ Re/hr to 220  $\mu$ Re/hr

[illegible]